JOURNAL
of
FARM ECONOMICS

UNIVERSITY OF MICHIGAN
MAR 1 1961
BUSINESS ADMINISTRATION LIBRARY

PROCEEDINGS

of the

ANNUAL MEETING

of

THE AMERICAN FARM ECONOMIC ASSOCIATION

AUGUST 10-13, 1960

IOWA STATE UNIVERSITY

AMES, IOWA

1959-60—THE FIFTIETH YEAR

THE AMERICAN FARM ECONOMIC ASSOCIATION
Volume XLII DECEMBER, 1960 Number 5

THE AMERICAN FARM ECONOMIC ASSOCIATION

PAST PRESIDENTS

William J. Spillman 1910-12
George F. Warren 1913
Daniel H. Otis 1914
Andrew Boss 1915
Harcourt A. Morgan 1916
Henry W. Jeffers 1917
George A. Billings 1918
John F. Fain 1919
Henry C. Taylor 1920
Walter F. Handschin 1921
Benjamin H. Hibbard 1922
Thomas P. Cooper 1923
Edwin G. Nourse 1924
Milburn L. Wilson 1925
Thomas N. Carver 1926
John I. Falconer 1927
Lewis C. Gray 1928
Henry E. Erdman 1929
Harold C. M. Case 1930
Oscar C. Stine 1931
John D. Black 1932
Howard R. Tolley 1933
William I. Myers 1934
Waldo E. Grimes 1935
Joseph S. Davis 1936
Oscar B. Jesness 1937
Ernest C. Young 1938
Irving G. Davis 1939
Foster F. Elliott 1939
Hugh B. Price 1940
Murray R. Benedict 1941
George S. Wehrwein 1942
Sherman E. Johnson 1943
Eric Englund 1944
Lawrence J. Norton 1945
Frederick V. Waugh 1946
Asher Hobson 1947
William G. Murray 1948
Oris V. Wells 1949
Warren C. Waite 1950
Forrest F. Hill 1951
George H. Aull 1952
Harry R. Wellman 1953
Thomas K. Cowden 1954
Joseph Ackerman 1955
Karl Brandt 1956
H. Brooks James 1957
Harry C. Trelogan 1958
Raymond G. Bressler, Jr. 1959
Willard W. Cochrane 1960

Price: $9 per year, this issue $2.00

Second class postage paid at Menasha, Wisconsin. Acceptance for mailing at a special rate of postage provided for in the Act of February 28, 1925, paragraph 4, section 412, P.L.&R., authorized November 27, 1931. Printed in U.S.A.

THE JOURNAL OF FARM ECONOMICS is published five times a year during February, May, August, November and December by The American Farm Economic Association. Yearly subscriptions $9. Published at Menasha, Wisconsin.

JOURNAL OF FARM ECONOMICS

December 1960

CONTENTS

Fellows of the American Farm Economic Association 1960 i
Higher Education and Agricultural Economics: A Critical Appraisal .....
.....*William H. Nicholls* 969
The Fiftieth Year Celebration Continued
Welcoming Remarks .....*W. Robert Parks* 991
An Historian Looks at the Past Fifty Years of the Agricultural Economics Profession .....*Vernon Carstensen* 994
An Economist Looks at the Next Fifty Years of the Profession .....
.....*Willard F. Mueller* 1007
Impact and Implications of Foreign Surplus Disposal on Underdeveloped Economies
Value of U.S. Farm Surpluses to Underdeveloped Countries .....
.....*Theodore W. Schultz* 1019
The Indian Perspective .....*S. R. Sen* 1031
Discussion .....*R. O. Olson* 1042
Discussion .....*Lawrence Witt* 1046
Impact and Implications of Foreign Surplus Disposal on Developed Economies and Foreign Competitors
The Competitor's Perspective .....*Erik Mortensen* 1052
The International Perspective .....*Mordecai Ezekiel* 1063
Discussion .....*Max Myers* 1077
Discussion .....*R. L. Kristjanson* 1081
The United States Department of Agriculture as an Instrument of Public Policy
The McNary-Haugen Episode and the Triple-A .....*Gilbert C. Fite* 1084
In Retrospect and in Prospect .....*Bushrod W. Allin* 1094
Discussion .....*Richard S. Kirkendall* 1103
Discussion: The Past Is Prologue; What Are the Prospects? *Ross B. Talbot* 1107
The Center for Agricultural and Economic Adjustment
A Description .....*J. Carroll Bottum* 1114
An Appraisal .....*John A. Schnittker* 1124
Discussion .....*Raymond J. Penn* 1132
Discussion .....*Carl Hamilton* 1135
Developing an Integrated Extension Program—Production, Marketing, and Public Affairs—on Agricultural Adjustment Problems
Achieving an Integrated Program .....*C. B. Ratchford* 1139
The Production Viewpoint .....*John O. Dunbar* 1151
The Marketing Viewpoint .....*D. Upton Livermore* 1157
The Public Policy Viewpoint .....*M. D. Thomas* 1162
Potentialities and Limitations of Comprehensive Supply Control
Supply Control: Ideas, Implications, and Measures .....*G. E. Brandow* 1167
Supply Control: Farmers Union View .....*J. A. Baker* 1180
Comprehensive Supply Control: The Farm Bureau Viewpoint *W. E. Hamilton* 1182
An Independent Viewpoint .....*D. E. Hathaway* 1190
Problems of Raising Incomes in Low-Production Areas of Agriculture
The Rural Development Program and Underemployment in Agriculture ....
.....*C. E. Bishop* 1196
Discussion .....*Ernest J. Nesius* 1206

The Role of Investment in Human and Community Capital ... *Lee R. Martin* 1210
Discussion ... *Raj Krishna* 1221
Market Power and the Farm Problem
The Superior Market Power of Food Processing and Agricultural Supply Firms—Its Relation to the Farm Problem ... *Robert F. Lanzillotti* 1228
Discussion ... *S. Kent Christensen* 1247
Discussion: The Relative Market Power of Farm Machinery Manufacturers ... *George R. Slater* 1252
Discussion: Market Power in the Meat Packing Industry ... *Elliott S. Clifton* 1256
Integration Revisited
Integration in Practice—The Broiler Case .. *W. R. Henry and Robert Raunikar* 1265
Discussion ... *Ewell P. Roy* 1274
Integration in Theory with an Application to Hogs ... *O. P. Blaich* 1280
Discussion ... *Frank H. Maier* 1293
The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk
The Comparative Advantage Aspects ... *Charles E. French and Earl W. Kehrberg* 1297
Discussion ... *Irving F. Fellows* 1310
The Role of Market Structures and Other Institutional Arrangements ... *Irving Dubov and M. Lloyd Downen* 1313
Discussion ... *Linley E. Juers* 1327
Rural-Urban Competition for Water
Price and Assessment Guides to Western Water Allocation ... *Karl Gertel and Nathaniel Wollman* 1332
Legal and Institutional Controls in Water Allocation ... *Stephen C. Smith* 1345
Discussion ... *David J. Allee* 1359
Discussion ... *Mason Gaffney* 1363
The Farm of the Future
The Organization and Structure of Some Representative Farms in 1975 ... *H. L. Stewart* 1367
Financing Representative Farms in 1975 ... *Aaron G. Nelson* 1380
Discussion ... *D. C. Myrick* 1390
Discussion ... *Howard W. Ottoson* 1394
Measuring Input Changes in Agriculture
The New USDA Index of Inputs ... *Glen T. Barton and Donald D. Durost* 1398
Measuring Inputs in Agriculture: A Critical Survey ... *Zvi Griliches* 1411
Discussion ... *Robert H. Masucci* 1427
Discussion ... *B. D. Gardner* 1430
Existing Programs for Data Processing on Electronic Computers
Analysis of Variance and Covariance ... *Arnold Grandage* 1434
Linear Programming on High Speed Computers ... *Rudolf J. Freund* 1439
Systems of Simultaneous Equations on the IBM 704 and 709 ... *Harry Eisenpress and Richard J. Foote* 1445
Regression and Systems of Equations Analysis on the IBM-650 ... *Harlow W. Halvorson* 1450
Problems of Method in Agricultural Economics Research
The Identification of Problems in Agricultural Economics Research ... *A. N. Halter* 1459
Discussion ... *W. B. Back* 1471
Are Agricultural Economists Becoming Mechanics? ... *Howard E. Conklin* 1475
Discussion ... *Earl R. Swanson* 1483
Contributed Papers: Teaching Agricultural Economics
Reorienting the Training of Agricultural Economists in Conformity with Changing Research Needs ... *Alan R. Bird* 1487
Foundation and Fashions in Farm Management Teaching ... *A. B. Lewis* 1488
Designing the Agricultural Business Curriculum ... *Lester V. Manderscheid* 1489

Goals of Education and Their Relation to Agricultural Economics Curricula ..... *Allen B. Richards* 1491
The Effect of Split Appointments on Undergraduate Teaching ..... *Milton M. Snodgrass* 1493
Proposals for Improving College Teaching ..... *Loyd K. Fischer and Robert M. Finley* 1494
Some Training Needs of Extension Workers in Farm Management and Production Economics ..... *E. P. Callahan* 1496
Contributed Papers: Land Economics, Farm Finance, and Institutional Economics
The Incorporation of Farms and Ranches—A Technological Breakthrough in Agricultural "Financial-Legal" Management ..... *Deon W. Hubbard* 1498
The Probable Role of Large-Scale Landlords in Farm Tenancy Improvement ..... *Russell L. Berry* 1500
Operation of the Irrigation Water Rental Market in the South Platte Basin ..... *Raymond L. Anderson* 1501
Natural Resources and Economic Growth ..... *Raleigh Barlowe* 1503
Conservation and Agriculture Adjustment—Competitive or Complementary? ..... *Melvin G. Blase* 1504
Contributed Papers: Farm Management and Production Economics
Withdrawal of Resources Out of Agriculture in an Expanding Urban-Industrial Economy ..... *Marvin W. Kottke* 1508
Heterogeneity in Agriculture: Impediment to Definition of the Farm Problem ..... *Harold F. Breimyer* 1509
Nonfarm Inputs in Agricultural Production: A Research Proposal ..... *Marshall Harris* 1511
Consideration of Time and Carryover Effects in Milk Production Functions ..... *Gerald W. Dean* 1512
Where Tenants May Profit by Seeding Cropland to Grass .... *Harry G. Sitler* 1514
Estimating Labor Requirements—A Broiler Production Example ..... *James A. Seagraves* 1516
Economic Implications of Drought Probabilities for Humid Area Irrigation ..... *Wayne F. Ehlers* 1518
Contributed Papers: Consumption, Marketing, and Distribution
Short-Run Demand and Supply Curves for Perishable Vegetables and Their Use in Analysis of Interregional Competition ..... *Donald E. Farris* 1520
Reflections on the Economic Implications of Short-Term Hog Feeding Programs in the Marketing Channel ..... *Thomas T. Stout* 1522
An Analysis of Response Variation Encountered with Selected Interviewing Techniques in Consumer Market Research ..... *Henry V. Courtenay and Robert E. Branson* 1523
Clothing Expenditures of Account-Keeping Illinois Farm Families, 1929-1958 ..... *Geitel Winakor* 1525
Relation of Profit Rates to Industry Structure in the Food Industries ..... *Lee F. Schrader and Norman R. Collins* 1526
Reports and Minutes
Annual Report of the President 1528
Report of the Secretary-Treasurer 1529
Report of Auditing Committee 1533
Report of Tellers Committtee 1534
Report of the Editor 1534
Report of the Awards Committee 1535
Report of the Student Activities Committee 1537
Report of the Agricultural Data Committee 1539
Report of the Resolutions Committee 1540
Minutes of the Meetings of the Executive Committee 1541
Minutes of the Annual Business Meeting 1545
Committees of the American Farm Economic Association, 1959-60 1546
Index, Vol. XLII 1546

AN HISTORIC DOCUMENT

The following statement, of interest in connection with the Fiftieth Year Celebration of the American Farm Economic Association, is reprinted from the *Report of the First Annual Meeting* of the American Farm Management Association, 1910, pages 3-4. The statement was adopted by the Association as showing the field covered by farm management and its relation to or correlation with other agricultural subjects. (See Henry C. and Anne Dewees Taylor, *The Story of Agricultural Economics,* pages 84-85.)

Analysis of the Rural Problem in Terms of Broad Divisions of the Subject Matter

K. L. BUTTERFIELD

1. The Technical Aspect: *Farm Practice* or *Agriculture.* How can the individual farmer most effectively and economically utilize the laws of nature in the growing of plants and animals?
2. The Business Aspect: *Farm Administration* or *Farm Management.* How can the individual farmer so organize the factors of production—land, labor, and capital—on his farm, so adapt farm practice to his particular environment, and so dispose of his product as to yield him the largest net return, while still maintaining the integrity of his land and equipment?
3. The Scientific Aspect: *Agricultural Science.* How can we learn more of those laws of nature which control the growth of plants and animals for human uses, how apply those laws to the procuring of an increased food supply, and how at the same time conserve the natural resources upon which the food supply depends?
4. The Industrial Aspect: *Agricultural Economics.* How can farmers as a class secure the largest financial success, while giving to the consumers an adequate food supply and maintaining the soil resources? How adjust systems of land tenure, means of transportation, methods of marketing, systems of taxation, institutions of credit, and protective and stimulative legislation to the legitimate industrial needs of the farming class?
5. The Community Aspect: *Rural Sociology.* How can the people who farm best utilize their industrial and social environment in the development of personal character, best co-operate for their common welfare, and so best maintain permanent institutions which are to minister to the continued improvement of the common or community life? How best organize the personal and community resources of the rural people for the purposes of contributing most fully to national welfare?

THE EDITOR *is indebted to Professor H. C. M. Case for the suggestion to reproduce this historic statement.*

FELLOWS
of the
AMERICAN FARM ECONOMIC ASSOCIATION

ELECTED 1957

John Donald Black*
Thomas Nixon Carver
Joseph Stancliffe Davis
Garnet Wolsey Forster
Asher Hobson
Edwin Griswold Nourse
Theodore W. Schultz
Henry Charles Taylor
Frederick V. Waugh
Milburn Lincoln Wilson

ELECTED 1958

Mordecai Joseph Brill Ezekiel
Oscar B. Jesness
William Irving Myers

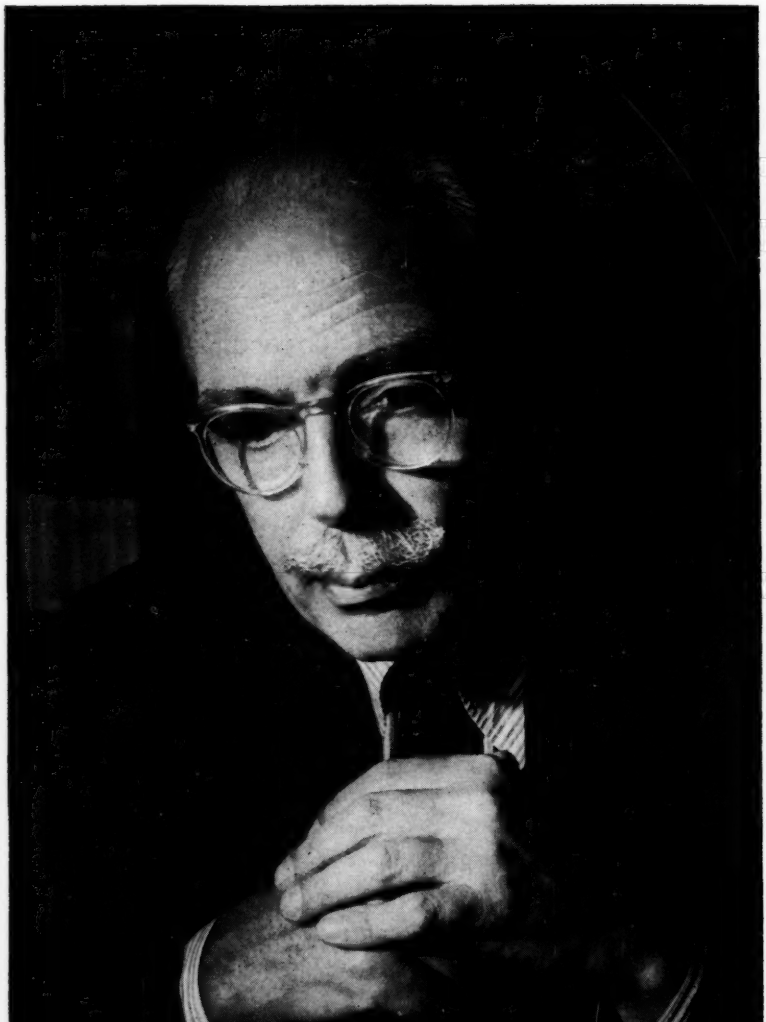
ELECTED 1959

Harold Clayton M. Case
Oscar Clemen Stine

ELECTED 1960

Leonard Knight Elmhirst
Sherman Ellsworth Johnson

* Deceased.



Lotte Meitner-Graf A.R.P.S.

LEONARD KNIGHT ELMHIRST

LEONARD KNIGHT ELMHIRST was born in Laxton Vicarage, Yorkshire, England, in 1893. As the son of a parson-landowner, he is one of a long line of the family of Elmhirst who settled and farmed in Yorkshire over 600 years ago.

He was educated at Repton, Cambridge, and Cornell. In 1953, Freiburg University, Germany, conferred on him an honorary Doctor of Political Science degree for his work, particularly in the field of international agricultural economics. Originally he was preparing for the ministry, but during sick leave as a result of World War I he served in India as secretary to Lionel Curtis, who drew up the original charter of freedom for India. This initial contact led to an enduring interest in the welfare of India. Following his studies at Cornell he returned to India in 1922 to take charge of Sir Rabindranath Tagore's Institute of Rural Reconstruction.

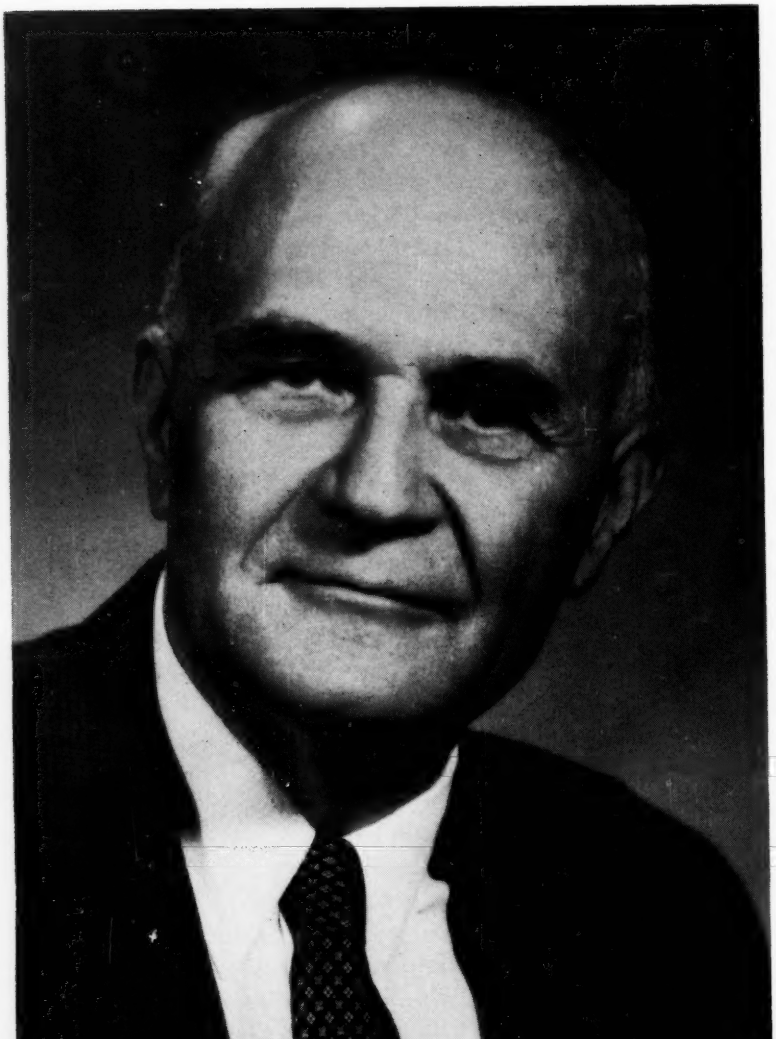
In 1925 he married Dorothy Whitney Straight and together they founded Dartington Hall in Devon, England, under a deed of trust. Although the various activities associated with Dartington Hall have engaged his main attentions during the subsequent years, he has found time for many other activities of a public nature, national and international. Chief among these was the founding of the International Conference of Agricultural Economists in 1929, of which he served as President for nearly thirty years, being elected Founder President in 1958. For over twenty years he was Chairman of the Executive of the Agricultural Economics Society of Great Britain, and President in 1949-50. He also served on the Executive of the Royal Society of Forestry for England and Wales for several periods and for a term as its President. He served on the National Parks Committee for Great Britain in 1948-52.

He has acted as a member of the Development Commission for the United Kingdom, an independent governmental organization founded in 1909 to study and foster progressive techniques and organization for agriculture, fisheries, and rural industries. He was one of the leading founders of Political and Economic Planning, a political organization established in 1931 to study economic and political problems of national and international importance, such as those associated with the "Common Market" in Europe.

As a member of the "Cohen Committee" he still takes an active interest in guiding the agricultural economics profession in the United Kingdom.

He has always believed that "man cannot live by bread alone" and has been deeply interested in education in its broadest sense. He has served as a member of the Council for the College of Exeter (now Exeter

(Continued on page vi)



SHERMAN ELLSWORTH JOHNSON

SHERMAN ELLSWORTH JOHNSON was born at Scandia, Minnesota, in 1896. He grew up on a dairy farm and found the path to higher education through the University of Minnesota School of Agriculture. He received his B.S. degree in 1924 and an M.S. in 1926 from the University of Minnesota. Further graduate study under a Social Science Research Council fellowship in 1929-30 led to the Ph.D. at Harvard University in 1938.

His earlier professional experience included teaching, extension, and research at the University of Minnesota, Louisiana State University, Montana State College, South Dakota State College (where he was Head of the Department of Agricultural Economics, 1930-33), and the Brookings Institution.

He has been with the United States Department of Agriculture since 1934 except for a short but memorable experience as Regional Director of Land Utilization with the Resettlement Administration (1935-36). In 1936 he joined the Bureau of Agricultural Economics, where he became Head of the Division of Farm Management and Costs in 1937 and Assistant Chief of the Bureau of Agricultural Economics for Production Economics in 1946. During part of World War II he served in addition as Chief of the Production Programs Branch of the War Food Administration, which had the responsibility for developing the wartime production goals program for agriculture. In the 1953 reorganization of the United States Department of Agriculture he became Director of Farm and Land Management Research in the Agricultural Research Service and since 1957 has been Chief Economist in the Agricultural Research Service.

He was elected President of the American Farm Economic Association for 1943, and is now President of the International Conference of Agricultural Economists for the period 1959-61. His writings include many bulletins and senior authorship of two books on farm management.

Sherman Johnson's international service has included assignments as agricultural economic consultant to the United Kingdom for the Economic Cooperation Administration in 1950; as member and chairman of the official exchange delegation of agricultural economists to the Union of Soviet Socialist Republics to study Soviet agriculture in 1958; and as Ford Foundation consultant to the government of India in 1959.

As one of the 1958 recipients of the Department of Agriculture Distinguished Service Honor Awards, Dr. Johnson was cited for "distinguished national and world leadership in research on the economics of agricultural production." He has led in the application of such analysis to the problems of an expanding agriculture. He was an early advocate

of a contingency reserve to prevent exploitation of soil resources and helped in formulating the basis for the Conservation Reserve Program. His advice on solutions to farm problems has been sought by Secretaries of Agriculture, administrators of farm programs, and leaders of farm organizations.

His capacity for inspiring mutual confidence has fostered closer working relationships in agricultural research between social scientists and natural scientists and between the Department of Agriculture and the Land-Grant Universities. His professional colleagues and young men alike have benefited from his friendly interest and support and his sound counsel and perceptive judgment.

LEONARD KNIGHT ELMHIRST

(Continued from page iii)

University) for twenty years. He has also been a member of the Education Committee for the County of Devon for some time and has served as Chairman of the Music Subcommittee from its inception. He was a member of the Commission for Higher Education in Rural India in 1952. He has been concerned with the importance of education in the arts and believes that balance between the needs of the body and those of the mind and spirit will lead not only to well-rounded individuals but also to improved human relations.

JOURNAL
OF
FARM ECONOMICS

Volume XLII DECEMBER, 1960 Number 5

HIGHER EDUCATION AND AGRICULTURAL ECONOMICS: A CRITICAL APPRAISAL*

WILLIAM H. NICHOLLS[1]
Vanderbilt University

"Go with me
To bless this twain, that they may prosperous be
And honour'd in their issue."
—Shakespeare, *The Tempest*

IT HAS become customary to refer to the agriculture of the United States and other advanced countries as "a declining industry." The fact that (in terms of employment, population, and number of farms) the agricultural sector of the American economy has been shrinking rapidly is undoubtedly in significant part attributable to the contributions which our great land-grant college system, including agricultural economics, has made to national economic development. From another point of view, however, it would almost appear that these agriculturally-oriented institutions have, in performing so well, worked themselves out of a job. To be sure, for some time to come, American agriculture will continue to have important technical and economic problems which demand solutions. But, since these problems are problems of plenty rather than shortage, they will probably seem remarkably unimportant in retrospect a generation from now. Meanwhile, the traditional constituency of the agricultural colleges will have shrunk considerably more. In the process, the economic success of those who remain in agriculture may have become more dependent upon having received a college education than ever before. However, as an offsetting factor, it is quite possible that American farms of the future will—because of larger scale, more adequate

* Presidential Address, delivered at the Forty-Ninth Annual Meetings of the American Farm Economic Association, Ames, Iowa, August 11, 1960.

[1] I am very much indebted to Professors Dale E. Hathaway and Earl O. Heady for their thoughtful comments and criticisms of the initial draft of this paper.

capitalization, and improved management—be managerially more self-sufficient, depending far less upon the public agricultural services which all of us have long since come to take for granted. Thus, it is not improbable that the various specialized fields of agriculture in this country may experience on balance a substantial decline in the domestic demand for their services during the next quarter-century.

If so, does this mean that American agricultural economics must also be a declining "industry"? If we remain complacent about the future of our profession, I believe that the answer is affirmative. However, if we are alert to the opportunities for developing new markets for our services both traditional and new, I believe that we can assure the future of agricultural economics in the United States for some time to come. But we cannot do so unless our departments of agricultural economics—like the Colleges of Agriculture of which they are a part—face forthrightly the present necessity of reappraising their objectives, their constituencies, their curricula, their research and extension programs, and indeed their whole reason for being. Of these important matters it is the undergraduate and graduate curricula with which I shall be primarily concerned in this address. First, however, let us look at some indicators of the present status of American higher education in agriculture.

I. *Higher Education in Agriculture Today*

Trends in enrollment and degree awards

Undergraduate enrollment in the nation's colleges of agriculture has declined sharply in recent years. From 1948 to 1959 alone, total undergraduate enrollment in agriculture in American land-grant institutions declined from 45,626 to 31,722, or nearly 30 percent. During the same period, while total undergraduate enrollment in the same institutions was increasing some 5 percent, the share of agriculture enrollment dropped from 11.7 to 7.7 percent. On the more favorable side, the number of Bachelor's degrees awarded by colleges of agriculture declined only from 8,187 to 7,214 (12 percent), indicating a considerable decline in the drop-out rate between entrance and graduation. Nonetheless, the trends in undergraduate agriculture enrollment have been decidedly unfavorable.[2]

In view of the rapid decline (both absolute and relative) in the rural and farm populations of the United States, these unfavorable trends may not appear to be surprising. However, given the fact that the number of medium to large commercial farms has been relatively stable since 1929,

[2] Statistics compiled or computed from Charles F. Simmons, "Agricultural Enrollment in Land-Grant Colleges and Universities," report (processed) presented to the American Association of Land-Grant Colleges and State Universities, St. Louis, Mo., Nov. 9, 1959.

this absolute decline in undergraduate enrollment is not so readily explained away. It should not be forgotten that, in recent decades, the reduction in numbers of both farms and farm people has largely come from small farms which, because of low incomes and often race, never contributed much to the college population; and that there has been a general rise in both levels of living on commercial farms and college attendance. Under such circumstances, the absolute decline in undergraduate enrollment must mean that rural youths are no longer enrolling in agriculture in nearly as high a proportion as they once did.

On the other hand, there has been a remarkable increase in the number of advanced degrees awarded in agricultural fields. During 1948-59, the number of Master's degrees in agriculture increased by 66 percent and the number of Ph.D. degrees by 94 percent. The ratio of Master's degrees to Bachelor's degrees nearly doubled, from 0.16 to 0.30, while the ratio of Ph.D. degrees to Master's degrees increased from 0.31 to 0.36. These trends undoubtedly reflect in part the large influx of foreign students during the last decade. Thus, the number of ICA agricultural participants studying in the United States rose from none to 1,207 during 1948-56, although little more than one-third of these were sponsored for more than six months. Perhaps more significant, there were nearly 4,100 foreign students who in 1955-56 were registered graduate students in land-grant institutions. Of these, perhaps 600-800 were specializing in agriculture and perhaps 200-300 in economics and agricultural economics. If so, foreign students may have constituted 9-14 percent of total graduate enrollment in the agricultural colleges—obviously an important sustaining factor for American higher education in agriculture. But the trends in graduate enrollment and degree awards also reflect a substantial upgrading or professionalization of higher education for American agricultural students as well. As a result, the total number of all degrees awarded in agriculture actually increased by nearly 3 percent during 1948-59, the relative importance of advanced degrees having meanwhile increased from 17 to 29 percent.[3]

Relative quality of students of agriculture

But what of the quality of the students in our agricultural colleges? At the undergraduate level, the picture is far from encouraging. When the Educational Testing Service analyzed the 1951-53 scores of nearly 500,000 male college students in the Selective Service College Qualifica-

[3] *Ibid.; Proceedings of the Sixth Conference for Agricultural Services in Foreign Areas,* Washington, Oct. 17-19, 1955 (Mimeo.), Exhibit M., p. 4; and Kenneth H. Parsons, "U.S. Training for Foreign Students in Agricultural Economics," *J. Farm Econ.,* 39:236-37 (1957).

tion Test, they found that agricultural colleges enroll a disproportionate share of very weak freshmen. Of eight broad fields of study, only education colleges had a lower mean score for freshmen while business schools tied with colleges of agriculture for the next lowest rank. Insofar as the poor showing of these freshmen was due to the inferior rural high schools from which many of them came, four years in the agriculture curriculum were not sufficient to reduce their initial handicap. Thus, the mean score for seniors in agriculture exceeded only that of seniors in education, with 71 percent of the former failing to make qualifying scores as compared with 50 percent for all college seniors. These results were consistent with the findings of an earlier analysis of 1950 scores of 10,000 men and women college graduates on the American Council of Education Psychological Examination. According to this study, the median scores of graduates in agriculture and in business tied for fourteenth place of twenty specialties. Only graduates in certain humanities, general education, certain social sciences, home economics, and physical education had lower median intelligence scores. (In striking contrast, college graduates in physics, mathematics, chemistry, and engineering outranked those in all other fields on both tests.)[4]

Thus, the undergraduate colleges of agriculture start with relatively poor quality freshmen who by the time they receive their Bachelor's degrees make an even poorer showing relative to most other graduating seniors. Like the colleges of business and education, the American agricultural colleges are caught in a vicious circle. Because so many of their students are weak, their curricula have become increasingly narrow, vocational, and descriptive; such curricula in turn attract weak students; and so on.

At the graduate level, however, the quality of students specializing in the various fields of agriculture is surprisingly high. Thus, graduate students in agriculture in 1950 tied with medical students for sixth place (out of 22 specialties) in their median scores on the A.C.E. Psychological Examination. Graduate students in business, education, and home economics, on the other hand, ranked as low as did the universe of college graduates in the same fields from which they were drawn. Furthermore, ex-

[4] Education Testing Service, *Statistical Studies of Selective Service Testing*, 1951-53 (Report S. R-55-30, 1955), as summarized in R. A. Gordon and J. E. Howell, *Higher Education for Business*, Columbia University Press, 1959, Table 20, p. 324; and Commission on Human Resources and Advanced Training (Dael Wolfle, Director), *America's Resources of Specialized Talent*, Harper & Brothers, New York, 1954, p. 199 and Appendix I, pp. 317-22. The low-ranking "certain humanities" included philosophy but excluded English, foreign languages, and fine arts; the low-ranking "certain social sciences" (which ranked 16th) excluded economics (8th rank) and history (12th rank).

cept for psychology and philosophy, only agriculture had graduate students whose median score was above the 75th percentile score of all college graduates in the same field.[5] That graduate students in the agricultural fields show up relatively so much better in intelligence and ability than do their undergraduate counterparts probably reflects primarily the relatively strong research emphasis and facilities, accompanied by relatively plentiful funds for research assistance and other financial aid, which the agricultural colleges can offer prospective graduate students. In any case, at the graduate level, the agricultural specialties do not appear to be lacking in students of relatively high intelligence. Even so, the general weakness of the agriculture curriculum—particularly in the communication skills, mathematics, and the social sciences—imposes a serious handicap which even the brighter college graduates can overcome only with considerable difficulty as graduate students.

The status of agricultural economics

In recent years, undergraduate majors in agricultural economics have perhaps accounted for 5-7 percent of all Bachelor's degrees awarded by American colleges of agriculture. At the graduate level, agricultural economics is a much more important field of specialization, in 1959 accounting for about 12 percent of total graduate enrollment (9,010) in all agricultural specialties. Only agronomy (including crops and soils) ranked higher (14 percent) in graduate enrollment, with zoology-entomology (9 percent) a poor third. The relatively great importance of agricultural economics as a graduate study is further indicated by the fact that in 1955-56 advanced degrees constituted about 40 percent of all degrees awarded in agricultural economics as compared with only 28 percent of the degrees awarded in all agricultural fields.[6]

As to the relative quality of agricultural economics students, I know of no direct evidence. The fact that college graduates in Economics considerably outrank intellectually their classmates in Business[7] suggests, however, that agricultural economics majors may also be somewhat superior in intelligence to the general run of agricultural undergraduates.

---

[5] *America's Resources of Specialized Talent, op. cit.*, pp. 200 and 317-22.

[6] Computed or compiled from Simmons, *op. cit.*, and U. S. Dept. of Health, Education, and Welfare, Office of Education, *Biennial Survey of Education in the U. S., 1954-56*, Washington, 1958, Chap. 4, Sec. 1, Table XXXVI, p. 102. The latter source reported that, in 1955-56, 354 Bachelor's degrees, 172 Master's degrees, and 61 Ph.D. degrees were awarded in the field of agricultural economics.

[7] *America's Resources of Specialized Talent, op. cit.*, pp. 199 and 317-22. According to this source, 1950 college graduates with Economics majors had a median score which ranked eighth among twenty undergraduate fields, as compared with only fourteenth (tie rank) for Business and Agriculture majors.

Because of the apparently fine screening between undergraduate and graduate work in the other agricultural fields of specialization, however, the relative quality of *graduate* students in agricultural economics may well be less impressive.[8] In any case, there must be a wide range among the various American departments of agricultural economics in the average intelligence level of their graduate students. The better departments, which approach our field as a tough and rigorous analytical discipline, probably attract into graduate work at least their share of the more intelligent and better prepared undergraduates. Other departments in which graduate work tends to be merely a further proliferation of undergraduate descriptive-institutional subfields, probably fail to offer enough intellectual challenge to attract students of more than the mediocre quality of most business schools. On the average, the quality of graduate students in agricultural economics probably falls short of the intellectual quality of their colleagues in general economics, who rank at about the middle of the range in graduate and professional education. Whether or not these speculations about relative quality are correct, however, I believe that it is clear that most agricultural economics students enter graduate school lacking more in preparation than in intelligence. What can be done to improve their undergraduate preparation and graduate training?

II. *The Undergraduate Curriculum*

Graduate work in agricultural economics draws most of its recruits from graduates of the agricultural colleges. A larger proportion of undergraduate majors in agricultural economics probably enter graduate school than is true of most other majors in the agricultural colleges. Nonetheless, many graduate students in agricultural economics have majored in other agricultural specialties as undergraduates. In either case, we agricultural economists have a very strong interest in the content and quality of the undergraduate curricula in agriculture and in our own field. What are the shortcomings of these curricula?

General undergraduate requirements

Let us look at the general requirements in the agriculture curriculum first. As one who hopefully reviews a number of applications from prospective graduate students in agricultural economics each year, I still have not become immune to the shock of this annual evidence of the inadequacies of the undergraduate agriculture curriculum. The courses in English and mathematics are usually minimal and frequently show very

[8] *Ibid.*, pp. 200 and 317-22. According to the 1950 survey reported in this source, out of 22 graduate and professional fields, the median scores of graduate students by fields placed Agriculture in fifth place, Economics eleventh, and Business eighteenth.

low grades which mar otherwise good academic records. Rarely has the applicant had courses in history or the social sciences other than economics and, even then, the courses tend to be narrowly specialized rather than broad and liberal in their scope and content. Training in even one foreign language is virtually non-existent. Little wonder that, by such objective standards as the Graduate Record Examination, most applicants from agricultural colleges show up so poorly in comparison with those with a liberal-arts background. The result, in a general Department of Economics such as Vanderbilt's where applicants from both backgrounds must compete for scarce financial aid on an equal footing, is that few applicants from agricultural colleges make the grade. In applying to the more typical land-grant college department of agricultural economics, agricultural college graduates are more protected, since they compete for financial assistance almost entirely against others of similar restricted background. However, I submit that such protection may come at considerable cost in the quality of graduate training. Such departments, no less than mine, have a strong interest in improving undergraduate preparation in the agricultural colleges.

Unfortunately, this protective spirit tends to begin in the freshman year. Historically, as in most business schools, the emphasis on the "practical" and the applied has too often isolated agricultural colleges from the rest of the academic community. As the number of specialized and often non-academic agricultural courses increased, the proportion of the work devoted to the more traditional disciplines fell. As experience showed that most agricultural students found it tough going in such regular academic courses as English, mathematics, physics, and chemistry, the pressures mounted to minimize these students' exposure to college-wide intellectual competition, getting them into the less demanding agriculture curriculum as quickly as possible. While the agricultural colleges have long since been engaged in training primarily professional specialists for agriculturally related employment rather than future farmers, the undergraduate curriculum has been very slow to reflect the increasing needs for a more general education or scientific rigor. Considering the rapidly improving quality of well-established agricultural research programs in the land-grant colleges—an advantage seldom shared by most colleges of business—it is difficult to understand why the agriculture curriculum has remained at so low a level. At his best, the graduate of the agricultural college has had a knowledge of relevant facts and relationships and an ability to apply his knowledge to the analysis of actual data which should make him a superior graduate student. More typically, however, he is peculiarly ill-prepared for high-level graduate work because he has wasted much of his time on courses which are vocationally rather than academically oriented, which are lacking solid ana-

lytical content, and which—showing little progression in difficulty in their more advanced phases—fail to challenge the academically superior students.

Fortunately, in recent years, some of the land-grant colleges have themselves begun to evince genuine doubts about the directions and quality of their curricula and have embarked on ambitious self-study plans. An excellent example is the recent report of a university-wide committee, under the chairmanship of Dale Hathaway, at Michigan State University. According to this committee, established curricula there need re-evaluation in order to give greater emphasis upon the liberal components of education and the theoretical aspects of each particular field, to eliminate those courses which rest on specific technique or narrow skills and the mere assimilation of present knowledge, and to give immediate attention to improving reading and writing skills. To implement these objectives the Michigan State committee recommended not only required general education courses during the first two years but a strong series of liberal arts electives in the final two years.[9] More broadly, two recent foundation-supported critical surveys of higher education for business[10] have stirred up much attention in business education circles, and promise to stimulate much constructive evaluation and reorganization of present business curricula. A comparable comprehensive survey of the nation's agricultural curricula would appear to be at least as much needed.

During the last two decades, the academic pressures upon college and university administrators to pay at least lip service to the idea of "general education" have become nearly irresistible. However, outside of the liberal arts colleges, this idea has in practice been more honored in the breach than the observance. The price which American institutions of higher learning have paid for our growing tradition of mass education has been increasing vocationalization. Agriculture and engineering (and the A. and M. Colleges of which they were commonly a part) which led the way in this movement, have at least had a sound scientific core and a maturity whereby they have eliminated some of the worst trade-school attributes of such late comers as colleges of business and education. Even so, the undergraduate agriculture curriculum today is typically far less "liberal" than it was at the turn of the century. Meanwhile, the agricultural faculty as a whole (despite an occasional rebel) has acquired vested interests in a proliferation of narrowly vocational courses, of which they themselves are largely a product, making curricular reform very difficult if not impossible. Furthermore, already on the defensive because

---

[9] Committee on the Future of the University, *A Report to the President of Michigan State University*, East Lansing, 1959, pp. 9, 12-13.

[10] Gordon and Howell, *op. cit.* (sponsored by the Ford Foundation); and Frank C. Pierson, *The Education of American Businessmen*, McGraw-Hill, New York, 1959.

of the relatively poor quality of their students, the agriculture colleges (unlike the colleges of business) have had this tendency strongly reinforced by the prospect of declining undergraduate enrollments.

Even if the agricultural faculty can be persuaded to accept the idea of liberalizing their undergraduate curriculum, an important problem often remains. This problem is the poor quality of instruction in the "liberal" subjects. From this standpoint, the agriculture college is fortunate if it is already a part of a single state university which has well-established faculties, majors, and graduate programs in the traditional liberal disciplines. Where the agriculture college is part of a state college in the A. and M. tradition, however, this problem is usually serious. First, the proponents of a more liberal agriculture curriculum have fewer allies among the faculty at large. Second, in such an environment, the liberal disciplines can hardly attract a high-quality faculty if their responsibilities are largely limited to elementary "service" courses, without the compensating stimulus of a major, graduate students, and research programs in their own specialties.

Here, I believe that the solution in most states lies in making the State College a State University not only in name (a change which has become nearly universal in recent years) but in fact and spirit as well. While there are admittedly economies of scale and of division of labor in higher education as in other fields, soaring college enrollments are rapidly eliminating the conditions which at one time made duplication—that is, state support of two general universities rather than one—clearly uneconomic. Insofar as possible, this upgrading process in one or both public universities should be facilitated further by transferring to former teachers colleges, community colleges, and extension centers the narrowly vocational curricula which have so seriously interfered with the attainment of high-quality professional and graduate training in the typical A. and M. college or state university. In such a new environment, even the agriculture faculty need not suffer severe quantitative attrition if, in addition to qualitative improvement aimed at developing a broader domestic market, it fully exploits (as I shall later argue it should) the potentially vast foreign market for its services.

The undergraduate major problem

The development of a satisfactory undergraduate curriculum in agricultural economics is at best peculiarly difficult, since our field has two important taproots rather than one. One of these taproots provides the biophysical elements and the other the socioeconomic elements, both of which are equally vital to our professional good health. Unfortunately, as part of the agriculture curriculum, agricultural economics has typically suffered from a lack of nutritional balance, with the biophysical tap-

root having developed an excessive number of small lateral roots and subroots, while the socioeconomic taproot has frequently atrophied or even died. Where this has happened it is in part attributable to circumstances largely beyond the control of the agricultural economics faculty, which frequently has been a minority interest in the agricultural faculty which fixes general undergraduate requirements for the pre-major years. Perhaps as often, however, the agricultural economics faculty has not even recognized that it does in fact have a minority interest which, if vigorously prosecuted, could win for its pre-majors a broader and more appropriate preparation for their major work than the standard junior-college requirements in technical agricultural subjects can provide.

In any case, for its own majors, the agricultural economics faculty can achieve considerable liberalization of the senior-college curriculum if it recognizes the need. First, it can sharply reduce its large number of specialized courses to a minimum core of basic subjects which are required of all majors. For example, a single one-year course in the Principles of Agricultural Marketing may easily cover all of the essentials of the subject matter frequently spread over a plethora of specialized courses in Livestock Marketing, Potato Marketing, Milk Marketing, Cooperative Marketing, and so on. Such specialized courses have a very high opportunity cost in terms of alternative courses foregone, not to mention their typically repetitive and non-analytical character.

Second, majors should be enabled and encouraged to take their minors in non-agricultural subjects where their aptitudes and interests make such minors appropriate. There is no reason why it should not become as normal for an agricultural economics major to take his minor in history, mathematics, or a social science as in one of the agricultural fields. This may even be so for specialists in farm management, which, while nominally the most vocational subject in agricultural economics, is now in many ways the most sophisticated in its economic-theoretical base and in its statistical-mathematical methodology. While such subjects as agronomy and animal husbandry are basic subjects in the farm management curriculum, the major contemplating graduate study may sometimes find a minor in statistics, mathematics, or general economics at least as appropriate as one in another agricultural field.

So far as general economics is concerned, however, I believe that the A. and M. university will be wise to have a single department of economics, including agricultural economics, instead of separate departments unless and until it develops into a truly general university. From my fond memories of my early years at Iowa State, I am convinced that a single department of economics, which is hospitable to the full continuum of faculty members and students from the most theoretical to the most practical, is to be strongly recommended. Such a setting avoids the

petty jurisdictional problems which so often plague separate departments; strengthens both the methodology of those faculty members with a more practical bent and the empirical sense of the theoreticians; and provides sufficient research opportunities and intellectual stimulation to attract outstanding general economists who would be repelled by the intellectual exile of a separate, strictly "service" department in a technical university.

Finally, the major curriculum in agricultural economics should leave at least 30-40 percent of the course load open for electives. The academically superior student should be actively encouraged to use these electives to develop his competence in at least one foreign language, his skill in English and mathematics, and his knowledge of history, philosophy, and the social sciences. Only thus can we agricultural economists revive and strengthen those liberalizing elements, derived from general economics and the other basic social-science traditions, which have been so important a part of our rich professional tradition.

Unfortunately, particularly at the undergraduate level, there are strong dangers that agricultural economics will show an opposite tendency in the face of declining agriculture enrollments. If we take the line of least resistance, as some departments of agricultural economics are already doing, we will increasingly shift our principal interests toward the area of agri-business administration. Such a shift might easily mean that agricultural economics would become a second-rate imitator of the nation's burgeoning business schools, most of which are already offering a second-rate education or worse. If we permit this to happen, undergraduate agricultural economics may survive on the basis of the increasing demand of the "agri-business" industries for our students, poorly trained though they might be. However, I for one would deeply regret such a tendency since the price of our survival could be stagnation, our field losing much of its traditional intellectual challenge and social-welfare orientation in the process.

III. *The Graduate Program*

During 1952-58, at least 500 Ph.D. degrees and perhaps 1,400 Master's degrees in agricultural economics were conferred in the United States. Is the quality of these graduate degrees all that it should be? If not, what steps can we take to bring them up to standard? Let us look first at the Master's degree program.

The Master's degree program

The Master's degree is obviously a terminal degree for large numbers of agricultural students. As such, it can continue to serve a very useful purpose in the training of county agents, future farmers, extension work-

ers, and other agricultural generalists. In my opinion, however, the importance of the Master's degree is overemphasized as part of the curriculum leading to the Ph.D. degree in agricultural economics. All too often, the Master's degree is a mere extension of a deficient undergraduate curriculum. This is especially true since virtually all American land-grant colleges award at least the Master's degree and in the vast majority of cases hold over their own undergraduates for a fifth year. In institutions whose undergraduate curriculum is as good as it should be, the superior college graduate with an agricultural economics major may often already have reached, in his undergraduate studies, the phase of diminishing returns, so that he should be encouraged to begin his graduate work elsewhere. If the undergraduate curriculum is poor, the superior college graduate should not be delayed another year in obtaining better instruction somewhere else. With the rapidly increasing number of departments of agricultural economics offering a doctorate as well, frequently on the basis of an inadequate graduate faculty, this problem may now be compounded by even more prolonged inbreeding.

To be sure, the Master's degree may sometimes be of value as a final screening device for selecting those students who should be encouraged to work for the Ph.D. degree. However, with sufficient upgrading of the undergraduate curriculum, including more emphasis upon report writing and research, the Bachelor's degree can be a much more effective screening device than it has customarily been. In fact, one of the paper miracles of the typical fifth-year agricultural economics student is his nearly universal ability to turn a C-average undergraduate record into a B-plus graduate record. In such cases, since it is usually the grading system rather than the student which has changed, the Master's degree is not such a useful screening device after all. Hence in appraising transcripts of agricultural economics students with Master's degrees, I have found the student's undergraduate record a much more accurate indicator of his true ability.

I do not deny that the Master's degree may have significant value, particularly in providing an initial research apprenticeship. At its best, as Connecticut and Kentucky have long demonstrated, the Master's degree can be both a highly respectable degree and an excellent step toward the doctorate in some other major graduate school. Too often, however, the typical Master's degree has a very high opportunity cost for those who subsequently continue through the doctorate. This follows because it delays for still another year the making up of deficiencies in general economics, mathematics, foreign languages, and the like. Such a delay would matter less if the graduate student were more often able or willing to take an additional two years of course work beyond the Master's degree. Since he usually is not, the frequent result is that the superior graduate depart-

ment lowers its standards to permit a premature awarding of the Ph.D. degree or (through the working of a kind of Gresham's law) loses many Ph.D. candidates to other graduate departments which are more accommodating.

If I am correct in these observations, a solution would appear to involve several important changes. First, the undergraduate curriculum should be upgraded by including much that is currently part of the Master's degree program, thereby providing an earlier and more effective screening out of those most clearly qualified for doctoral study. Second, superior majors should be encouraged to shift to another institution for even their first year of graduate work. Third, entering graduate students of superior quality should be encouraged to plan their curriculum from the beginning with an eye to meeting the optimum requirement for the Ph.D. degree, in some cases perhaps by-passing the Master's degree altogether. Finally, more departments of agricultural economics should take pride in the quality of their Master's degree, which often might better be substantially upgraded before they expand into a Ph.D. program of questionable quality.

The doctoral program

Of the 500 Ph.D. degrees in agricultural economics conferred during the seven years 1952-58, Cornell, Iowa State, Wisconsin, Purdue, and Minnesota (in that order) accounted for 55 percent. Illinois, California, Ohio State, Chicago, and Michigan State followed with a total of 28 percent. Thus, ten institutions (only one private) awarded 83 percent of all doctorates in agricultural economics. Despite this high degree of concentration, however, the general trend in concentration was downward. Thus, the share of the top five institutions fell from 64 to 49 percent between 1952-54 and 1956-58, while the share of the second five was increasing from 25 to 31 percent. Even more significantly, the share of all other institutions increased from 11 to 20 percent. In the interim, the number of institutions awarding one or more Ph.D. degrees in agricultural economics had increased from 20 to 26, with four additional departments reporting their first doctoral dissertations in progress during the later period. While the total number of degrees conferred during the three years 1956-58 was 225, as compared with 199 during the earlier three-year period 1952-54, only 64 degrees were conferred in 1958, 35 percent below the peak of 98 in 1954.[11] Hence, graduate education in agricultural economics appears to have the prospect of considerable "excess capacity" which can presumably be eliminated only by an expanded market for its services or by the exit of "firms."

[11] Based on the annual listings of Ph.D. degrees conferred in agricultural economics, as published in the May issues (1953-59) of the *Journal of Farm Economics.*

This problem of "excess capacity" is unlikely to be solved via the reduction in the number of departments offering the Ph.D. in agricultural economics. Our "industry" is relatively well insulated from the normal workings of the market mechanism on both the supply and demand side. On the supply side, we are engaging in "cutthroat competition" for our student raw materials, thanks to generous subsidies from sources unusually insensitive to (although ultimately perhaps not wholly immune from) "profit-and-loss" considerations. As a consequence, our raw materials are highly uneven and too often substandard in quality. Since our processing techniques are also by no means fully standardized, neither are our final doctoral products. Hence, quality control is one of our major problems. Nor can we count on the demand side to solve this problem. For there the markets for our services are not sufficiently discriminating to establish price differentials fully reflecting actual differences in quality or production cost.

The quality-control problem would not be so important if the dominant "firms," as the producers of most of our output of doctorates, produced a product which (however much differentiated) was of consistently high quality. If they did, our large numbers of small "firms" could even turn out a uniformly poor product without, because of their relative small aggregate importance, doing much harm. However, an analysis of the results of our Association's awards program since 1945 does not support the view that the output of our dominant firms is either of uniformly high quality within the dominant group or consistently superior to the product of our many small "firms."

Before turning to this analysis, let me say that I am here using the results of our awards program as a criterion of quality only for the want of anything better. Those of us who have been members of the Awards Committee know full well how imprecise the judging process is and how often the several judges are unable to reach a fully satisfactory consensus. Furthermore, in the dissertation awards at least, the larger graduate departments have been handicapped by our rule permitting no department, regardless of number of graduate students, to submit more than one dissertation for each year's thesis competition. Even so, an analysis of the results of our awards program is not without considerable significance.

Thus, we find that during 1950-58 this Association made 27 Ph.D. Dissertation Awards (excluding honorable mentions). These awards went to only 12 institutions, a select group which failed to include four of the twelve institutions ranking highest in total numbers of Ph.D. degrees conferred. In absolute numbers California, Minnesota, Harvard, Chicago, and Iowa State led, together accounting for two-thirds of the awards. However, for the twelve award-winning institutions the coefficient of rank correlation between number of dissertation awards and total dissertations conferred was not significant (0.388).

On the other hand, there was a highly significant inverse relationship between absolute output and the number of dissertation awards per 100 Ph.D. degrees awarded. Four of the award-winning institutions (Johns Hopkins, Oregon State, Harvard, Vanderbilt) averaged less than two doctorates in agricultural economics per year, but of these approximately 33 percent won dissertation awards. Five institutions (California, Chicago, Minnesota, Illinois, Michigan State) averaged 3-6 Ph.D. degrees per year, of which about 10 percent won awards. Finally, three institutions (Iowa State, Cornell, Wisconsin) averaged 7-11 degrees annually but only 3 percent of their dissertations were honored by an award.[12] The coefficient of rank correlation between absolute output and relative number of awards was a very high −0.818. While the larger departments might have made a better showing had the award rules permitted them to have proportional representation, these results at least support the view that the smaller department can turn out a quality product even if it falls far behind in the numbers game. They also indicate that, of the six departments (all public) ranking highest in total degrees conferred, California and Minnesota had distinctly superior records.

Alternatively, let us analyze the record of our Association awards for published research beginning with the Farm Price Policy Competition for 1945 and including all other awards for published research and for "best" *Journal* articles. During 1945-58 our Association made 60 awards (excluding honorable mentions). Of the 60 award winners, 25 percent received their Ph.D. degrees from Harvard; another 25 percent from California and Wisconsin; and 27 percent more from Chicago, Iowa State, and Columbia. Since the research awards were made to a group of considerably older, more mature agricultural economists than were the dissertation awards, these results reflect in part the earlier (largely pre-war) dominance of certain institutions whose relative importance as graduate centers has meanwhile declined considerably. This is particularly true for the private institutions, which together accounted for 42 percent of the published research awards but for only 30 percent of the dissertation awards. Even so, Harvard appears to have maintained quality in spite of a substantial decline in quantity while Chicago has captured a remarkable proportion of both types of awards for a late-comer. According to either index of absolute quality, California and Iowa State have been outstanding among the public institutions.

Finally, it is interesting to analyze the composition of the institutional employers of the Association's winners of research awards. Here, the U. S. Department of Agriculture dominated, accounting for 23 of the 60 awards—a remarkable record considering its continuing political vicissitudes and its declining relative salary advantage. (The subsequent effects

[12] In terms of awards per 100 degrees, the twelve institutions ranked in the order indicated in the text, except that Iowa State and Michigan State tied.

of these unfavorable factors on the ability of the U.S.D.A. to retain most of its award-winners should not pass unnoticed, however.) Fifteen educational institutions accounted for 34 awards. Of these, Chicago dominated with 8, followed by Stanford with 4. Land-grant institutions as employers captured only 22 awards, of which Michigan State (4), Connecticut (3), Iowa State (3), Pennsylvania (2), and Wisconsin (2) received nearly two-thirds. Considering its enormous research resources both professional and financial, the record of the land-grant college system in accounting for only slightly over one-third of the Association's research awards is rather shocking. May we not interpret these results as indicating that most of the land-grant colleges have routinized their agricultural economic research programs, leaving to the U.S.D.A. and the private institutions most of the truly bold, original, and forward-looking research effort? If so, I am sure that part of the blame lies in the pernicious effect of earmarked federal research funds, particularly those under the Research and Marketing Act. But at least as much to blame (it is worth noting that a number of our award-winning research products were financed by RMA funds) is the lack of insight and imagination in most land-grant research programs, as a result of which almost wholly exhausted soils continue to be plowed to excessive depth while other highly fertile, virgin soils remain virtually unscratched. In any case, because research and graduate education are so intimately interrelated, inferior research programs are likely to mean inferior graduate curricula and routine dissertation projects which are largely self-perpetuating.

Isn't it high time that more agricultural economists in the land-grant colleges took a hard new look at their present research programs, with a determined effort to adapt them to present problems and prospective needs? If they did, they would more generally recognize the paramount fact that many of the most important economic problems of agriculture —e.g., those of low-income rural areas, national and regional economic development, and factor immobility—must find their solutions largely outside of agriculture. Such broad problems do not fall neatly within the traditional specialized fields of agricultural economics, with the consequence that breadth of perspective and more general training are increasingly at a premium.

No longer can doctoral programs in agricultural economics afford to be satisfied with an output of extremely narrow specialists who are incapable of tackling a wide range of economic and social problems as they relate to agriculture. Henceforth, if they are to prepare their graduate students to be fully productive throughout a long professional career, these programs will have to aim for the flexibility and adaptability which only a very broad and general graduate curriculum can provide. Above all, these doctoral programs must make research workers conscious

of the tremendous challenge of finding useful solutions to important new problems, with the most efficient tools chosen in a problem-solving context, instead of encouraging them to select problems which, while much less important, are simply more amenable to attack by fashionable new tools, econometric or otherwise. In the absence of these changes, much of the responsibility for research on many vital problems of agriculture will continue to be seriously neglected or will (as the field of population once passed from economics to sociology) go to other disciplines by default. This need not happen; but it will surely do so unless quality more universally displaces quantity as our principal criterion of a "successful" doctoral program.

In closing this section, I must express my own personal regret and deep concern at the decline, both relative and absolute, in the role of the private institutions in graduate training in agricultural economics. The demonstrated excellence of the agricultural economists produced by the private universities is, in my opinion, ample proof that a graduate curriculum which contains at most two or three specialized courses in agricultural economics is actually an asset rather than a liability. Even so, I cannot find any reasonable basis for believing that the strong trend from private to public universities can or will be reversed. As a result, there is a very real danger that our profession is becoming increasingly more specialized and narrow—a tendency which henceforth only the land-grant college system can prevent if it is to be prevented at all. This is a heavy responsibility but one which I would urge the land-grant institutions to accept with all the vigor and breadth of vision at their command.

IV. *Ideas for Export*

In this review of American higher education, we have seen that our agriculture colleges have recently been experiencing an alarming drop in undergraduate enrollment. While these colleges have slightly more than held their own in total enrollment, thanks to their burgeoning graduate schools, one cannot be sanguine about their long-term prospects in view of the rapid shrinkage in the agricultural sector of the American economy. If the field of agricultural economics has thus far fared somewhat better than the average agricultural specialty, the prospective domestic demand for its services hardly provides a basis for much optimism about its future either. Believing firmly that our unique land-grant college system has been one key factor responsible for the spectacular economic development of the United States, I can feel only strong regrets at the possibility that these great educational resources may be entering a declining phase of their history.

My regrets are all the stronger because, despite my previous critical comments, I am convinced that our land-grant college system stands at

an all-time peak in the quality and quantity of its personnel and in the degree to which its superior personnel, once the monopoly of a few outstanding and rich agricultural institutions, has now become much more widely dispersed over the nation. Given such a hard-won wealth of such specialized research and educational resources, the already current problem of "excess capacity" which plagues most agricultural colleges and departments of agricultural economics is a supreme tragedy. Nonetheless, unless we can find new markets for these resources, we shall have to accept as the only economically sound solution of our "excess capacity" problem a reduction in their supply to fit the smaller demand. Fortunately, such an outcome can be entirely avoided for a long time to come if professional agriculturists, public agencies, and private foundations seize the new opportunities for service which are readily at hand.

Here, the experience of Aladdin Industries, Inc. offers a relevant example of how we can survive to the greater service of mankind. This firm once served most of American agriculture well by developing and marketing widely its famous Aladdin Lamp. However, with the nearly complete rural electrification of the United States after 1933, the domestic market for the Aladdin Lamp was almost completely wiped out. In spite of this potentially lethal blow, the Aladdin firm refused to die. Instead, it turned to the manufacture of new products for the domestic market and began to exploit vast new export markets for its original lamp. As a result, it is now not only saving the eyes of rural youth in numerous underdeveloped countries but has survived and prospered in the bargain. If the agriculture colleges are sufficiently flexible and adaptable, they will be no less wise in taking their own lamp of knowledge to a world which has a crying need for the American miracle of agricultural productivity. Let us export our ideas, which far more than any commodity, can indeed accomplish such miracles!

I am well aware that already the American agriculture colleges have been increasingly drawn into the foreign field through supplying a rapidly growing number of our own agricultural technicians for work abroad, through numerous contracts with ICA and other agencies to carry out directly certain technical assistance activities overseas, and through acting as host university in the advanced training of many foreign students. Unfortunately, however, the agriculture colleges have assumed these important new responsibilities more by drift than by design. The consequence has been that, on the whole, their actual performance in these foreign activities has fallen much short of the high potential we have come to expect of our land-grant college system. In its Technical Cooperation Program, the U. S. Government probably has more technical specialists in agriculture than in any other subject matter field. This is wholly appropriate, in view of the primary importance of agriculture

in most underdeveloped countries. However, many foreign openings for American agricultural specialists have gone begging or have been filled with men of inferior ability and training for the want of better men. Too often, the land-grant colleges have honored their contractual obligations for technical assistance by sending abroad their most dispensable personnel rather than their superior staff members. Not infrequently, the increasing relative importance of foreign-student enrollment has not influenced the theoretical content or institutional framework of the graduate curriculum by a jot or tittle. At times, much of the agricultural faculty has been almost completely ethnocentric; abysmally ignorant of other lands, languages, and cultures; and too inexperienced and inflexible to apply its knowledge of principles to radically different overseas situations.

That the agriculture colleges have not met this new challenge more fully and effectively is understandable enough at this juncture in our nation's history. After all, not long since, even an American manufacturer often considered his export business so peripheral in importance that he ignorantly shipped Spanish-labelled goods to Brazil, sent salesmen abroad who spoke only English, and then was surprised when his British and German competitors got all the business. But the American agriculture colleges may yet face the day when, like such British or German manufacturers, they must "Export or die!" In any case, if they are to remain strong and prosperous, they must begin to take their export business seriously. At the very least, this means that they must, in Professor Witt's words, "build an international dimension into the warp and woof" of their institutions and their various disciplines; and must make international relations a part of all their efforts "in the same way mass education and later adult education became an integral part of our colleges and our society."[13] Under Witt's leadership, Michigan State University has taken a very important first step toward this objective. Its recent comprehensive survey of Michigan State's international programs, and of the problems and opportunities which these programs create, resulted in an excellent and stimulating report which might well be emulated by other major land-grant universities.[14]

If the agriculture colleges are to acquire this much-needed international dimension, they must develop new curricula which better prepare American students for overseas career opportunities and which will better serve the needs of their increasing proportion of foreign students. They must develop new policies on salaries, promotions, and leaves which rec-

[13] Lawrence Witt, "Toward an International Dimension in Agricultural Economics," *J. Farm Econ.*, 41:220 (1959).

[14] Lawrence Witt, "Toward an International Dimension at Michigan State University" (proc.), East Lansing, Aug. 1959.

ognize that foreign experience is an asset rather than a liability, both for the individual faculty member and the university at large. They must encourage their outstanding research workers to devote some part of their careers to the study in other countries of problems which fall logically within their own specialties. Because of its natural alliance with the broader field of economic development, agricultural economics is a logical source of leadership both in making the agricultural colleges more fully cognizant of the need for an international dimension and in implementing any international objectives, once they are agreed upon. Many agricultural economists have already been providing much effective leadership in these directions and it is to be hoped that still more of them will soon see fit to do so.[15]

In arguing thus, I nonetheless recognize that there are serious problems of planning and financing optimum international programs within the current national context. It is too much to expect most state legislatures to appropriate a substantial part of the funds which the agriculture colleges would need to fill their potential international role. Insofar as these programs are to be publicly financed, most of the funds will continue to come from the federal government. The shortcomings of present federal financial support are considerable. Perhaps most serious is the hand-to-mouth basis upon which so many of the ICA's educational and technical-assistance programs operate. Almost invariably ICA sponsorship of foreign students for training in the United States is limited to a single year or less, yet deficiencies of language and previous training are usually such as to make the second year of American study yield highly increasing returns. The typical ICA contract of two years, extended on a year-to-year basis, is hardly conducive to long-term planning of either program or personnel.

Until Congress is willing to accept the fact that American self-interest demands our taking a long view in the federal support of international education both at home and abroad, and provides for much more generous support over minimum periods of at least ten years, neither ICA nor

---

[15] During the four years 1955-58, fifteen American departments of agricultural economics awarded 47 Ph.D. degrees (excluding 14 to Canadians) to students who had taken their Bachelor's degrees at a foreign university. Of these, nearly half were accounted for by Wisconsin (9), Cornell (8), and Iowa (5). Minnesota, Illinois, and Ohio State awarded four each, California awarded three, and Purdue and Chicago two each. Relative to the total Ph.D. degrees granted, Wisconsin (28 percent), Ohio State (24 percent), Cornell and Minnesota (22 percent), and Illinois (17 percent) conferred the most Ph.D. degrees on foreign students. California, Chicago, Iowa State, and Purdue followed with 10-14 percent each.

With less than ten doctorates a year being awarded to agricultural economics students from the underdeveloped countries, our profession is as yet hardly more than scratching the surface in making our own contribution to one of the world's vital training needs.

its American university contractors can best fulfill this essential international responsibility. Enlightened Congressional action must in turn rest upon a more enlightened general electorate and reduction in the short-sighted opposition from all kinds of special interests within American agriculture to the use of American resources to increase agricultural output abroad. Meanwhile, however, the more foresighted and imaginative agriculture colleges are finding the private foundations highly receptive to proposals which meet important needs in the field of international education. Cornell's Graduate Program in Extension Education and California's partnership with the University of Naples in a new Center of Agricultural Economics are outstanding examples. Certainly, both the agriculture colleges and the foundations need to be even more diligent and active in finding areas of mutual interest to spread the benefits of our great land-grant college system to the many agriculturally backward nations of the world.

I believe that recent experience at Vanderbilt University is worth citing in this connection. Our Department of Economics is now in the fourth year of its Graduate Program in Economic Development, which offers a special curriculum leading to the M.A. degree in Economics for some 25 students per year from underdeveloped countries. From the beginning, the basic financial support for this program has come from ICA. By now, however, some half of our foreign students are financed from other outside sources, permitting us to admit many worthy students who do not meet ICA specifications—particularly the one requiring status as a government employee in the home country. Furthermore, thanks to a Ford Foundation grant, we can annually select and finance 3-5 of the most promising of our first-year foreign students for entrance into our regular Ph.D. program. In addition, we have five National Defense Education Act fellowships which will finance American students interested in economic development for three years, including a third year in an underdeveloped country for dissertation research. Finally, under a Rockefeller Foundation grant, we have been able to overstaff to the extent of three economists and one political scientist, thereby freeing annually an equal number of our faculty on a rotating basis for teaching and research in selected universities in underdeveloped countries.

Thus, our outstanding graduate faculty in economics has solved its own problem of "excess capacity" by the development of a well-integrated international dimension. Through a very effective combination of funds derived from our own university, the federal government, and private foundations, we have been able to plan ahead for 5-10 years. In the process, we have fitted an important part of our graduate curriculum to the needs of our foreign students; we have largely solved the difficult selection problem through our overseas faculty and through creation of a large

pool of first-year foreign students from which we can from personal knowledge discover those most deserving of further investment; we have found means of assuring a faculty which is rich in foreign experience; and we have made it possible for our faculty members and American graduate students to develop a lively interest in research which applies their specialized knowledge to the problems of other economies and cultures. Not only has this combination proved to be remarkably effective in meeting its international objectives but it has been exciting and enriching to our entire faculty, our regular graduate students, and the University at large.

No less than the private universities, the agriculture colleges and their departments of agricultural economics have a tremendous opportunity to exploit this vast new export market for ideas. In my opinion, if they fail to do so, they will stagnate or even seriously decline during the next generation. But we must not allow this to happen. During its first century, the American land-grant college system has met every challenge with superb response. With such a background of solid domestic accomplishment, the land-grant system can surely look forward to a second century in which its benefits can be extended fully to all of mankind!

THE FIFTIETH YEAR CELEBRATION CONTINUED

CHAIRMAN: WILLARD W. COCHRANE, UNIVERSITY OF MINNESOTA

WELCOMING REMARKS

W. ROBERT PARKS
Dean of Instruction, Iowa State University

PRESIDENT HILTON very much regrets that he cannot be here today to welcome your group, a group with which he has long had such a close association and for which he has such a high regard.

When I was designated as the substitute welcomer for the host institution, I started searching for some sort of a gimmick which would reduce the amount of preparation, but, nevertheless, would sound sufficiently learned. The obvious device was to build my remarks around the fact that the AFEA was organized here in Ames and had returned to this spot to celebrate its golden anniversary.

Then a real labor saving idea came to me. I remembered that about this time last year, I talked to the American Poultry Science Association, whose last meeting in Ames had also been in 1910. The two occasions seemed so similar that I figured I ought to be able to change a few key words and use the same speech here. So I developed a "key word" substitution plan. I asked myself, what are the most common words with the poultry scientists? They are "chicken," "turkey," "broiler." And what words do agricultural economists use again and again?—"surplus," "parity," and "soil bank."

I decided to take the Poultry Science speech, and wherever the word "chicken" appeared, I would substitute the word "surplus," for the word "turkey," I would substitute the word "parity," and wherever the word "broiler" appeared, I would substitute the words "soil bank."

Armed with this "key word" substitution list, I located last year's speech to the Poultry Science Association, and set about converting it for the AFEA meeting. But the results were distinctly disappointing.

The first paragraph to the Poultry Science people read as follows: "When you last met in Ames, back in 1910, every farmer was attempting to raise a small flock of *chickens.* Equipped with little more than some folklore on the subject, he was also trying to raise enough *turkeys* to provide for Sunday dinners. If a *chicken* ran into an accident, it was converted into a succulent *broiler.*"

But look how it came out when I made the appropriate "key word" substitution in order to present the speech to you agricultural economists:

"When you last met in Ames, back in 1910, every farmer was attempt-

ing to raise a small flock of *surplus*. Equipped with little more than some folklore on the subject, he was also trying to raise enough *parity* to provide for Sunday dinners. If a *surplus* ran into an accident, it was converted into a succulent *soil bank*."

Well, as you can see, we couldn't go on with that. There were too many political implications for an election year. And, even worse, I wasn't entirely clear what the political implications really meant.

So let's forget Poultry Science, but not the fact that the AFEA was organized here at Iowa State 50 years ago. It is interesting—and it speaks well for the foresight of the founders of this Association—that your Association, which has been such a dynamic force for broadening the outlook of the farmers and of the nation's policy-makers and administrators, should have been established at a time when American society was immensely self-satisfied, and when the Land-Grant Colleges—including the host institution, Iowa State—were extremely narrow in the definition of their goals.

This extreme narrowness in the definition of goals, which characterized the Land-Grant College movement from about 1900-1913, was a pretty direct reflection of the comfortable attitude of American society of the immediate pre-World War I period. If Americans were not living in a "golden age," they were living in a "golden dream world" in their social and economic thinking. The possibilities of a foreign war seemed very remote, not worth worrying about. Everywhere business was booming. Of course, the muckrakers were abroad in the land, pointing out dangerous and unsanitary working conditions in our factories and jungle-like living conditions in our growing city slums. But to most Americans life seemed good. Even the farmer of 1910 was enjoying "parity," although he had never heard of the word.

The curriculum offered here at Iowa State, and at the other Land-Grant Colleges, reflected this comfortable and optimistic social attitude. Never before, or since, has the curriculum been so narrowly specialized and vocational. It was during this period that Iowa State College, and others like it, almost settled down to the limited task of turning out nothing but "master farmers" and "model housewives." The pressure from farm leaders everywhere had been heavily in that direction. Here in Iowa, "Uncle Billy" Wallace and "Tama Jim" Wilson had been carrying on a running fight with the College at Ames. They had accused the professors of idolizing and attempting to imitate the Ivy League professors. The Ag College was supposed to teach people how to farm, and that was that.

Now, as the members of the AFEA return, after 50 years, to the Association's birthplace, many of the changes which have come about are too self-evident to require listing. Iowa State College has become a university composed of six colleges. The expansion and sophistication of our cur-

riculum here, as in all the schools from which you come, can be appreciated by a glance at the catalog. Some pressures remain the same, and yet they are very different today. For example, Iowa farmers are still quite interested in how this institution at Ames spends their money. They are just as insistent as were "Uncle Billy" Wallace and "Tama Jim" Wilson that the professors at Ames "do something sensible and practical" to help the farmers. But, whereas the most "sensible" thing that the farmers could think to ask of the ag college in 1910 was to teach them how to grow "two blades of grass," in 1960, the leading farmers in the state believe that the most practical thing that the Ames professors can do is not to throw all of their resources into the developing of new production techniques, but rather to deal with the many complex social, economic and political problems which are involved in helping the nation's agriculture adjust to a dynamic and growing economy. The Center for Agricultural and Economic Adjustment, located on this campus, was established in response to the felt need for making a truly broad-based attack upon these problems.

I am sure that the process of growth and change since 1910, to which I have just alluded, is typical of the changing academic pattern in your states. Through it all, the American Farm Economic Association has stood as a group of scholars—and sometimes effective "actionists"—devoted to the broad study of the agricultural economy. Sometimes the Association's members have been roundly ignored by the policy-makers. But, as we enter the 1960's, we find the public so honestly confused about the answers to the "farm problem" that their political representatives can be expected to depend more and more upon the scholarly research findings and professional judgment of the members of this Association.

Iowa State is proud of the fact that your Association was organized here. We are honored by your having elected to return here for your golden anniversary meeting. So, in behalf of President Hilton and the faculties of Iowa State University, I most sincerely welcome you back home.

AN HISTORIAN LOOKS AT THE PAST FIFTY YEARS OF THE AGRICULTURAL ECONOMICS PROFESSION

VERNON CARSTENSEN
University of Wisconsin

WHEN Professor Cochrane wrote me last October asking me to prepare a paper on the subject announced, I accepted the assignment with some misgivings. A profession represented by over 2,500 members, almost all with advanced degrees and a large number also professors, may be easy enough to look at but impossible to catch within any generalization or, as you would probably say, a rigorously developed theory.

I am certain that I have not seen the profession steadily and I have not not seen it whole, but I trust that I have done as well as the least fortunate of the blind men who went to see the elephant. It may be that I have not touched the trunk, or the mighty leg, or the great wall-like body, but I can hope that I have at least gotten hold of the tail or some other recognizable part of the gigantic and wonderfully made beast.

When I first thought about the task before me, I was struck by several things that I am sure have no connection. This Association marks its beginning, if not the beginning of the profession of agricultural economics, with a meeting held fifty years ago on this campus attended by a scant dozen men. At that time American farmers were enjoying what many would later call the golden age of American agriculture. The census that year reported over six and a third million farms in the United States. Since then as everybody knows the Association has grown and prospered while the number of farmers has declined and their lot has become more difficult.

Agricultural economics as a recognized discipline owes its origin to a number of diverse factors. It is, of course, a part of the old and respectable field of political economy and the newer field of economics. In the U.S. it also owes something to the agricultural societies of the late 18th and early 19th centuries, to the rise of the colleges of agriculture, and to the early 20th century preoccupation with what might be called the religion of efficiency.

The agricultural societies reflected in their origin and purpose the widespread belief that man not only *could* but *ought* to improve himself and his institutions. A necessary step in this direction was the accumulation of knowledge. This belief touched agriculture as well as most other parts of society. Thus the Massachusetts Agricultural Society was organized in 1792 with the purpose, according to the founders, of encouraging and rewarding men of enterprise who made useful discoveries and communi-

cated them to the public. Thomas Jefferson, in writing the constitution for the Albemarle Agricultural Society, stated that one of the principal purposes of the association was to collect information on all of the good and bad agricultural practices of the region. Jefferson thought, "the choicest processes culled from every farm, would compose a course probably near perfection."[1] Similar aspirations were expressed by the farmers clubs of the 19th century, organizations much more likely to be in the hands of full-time farmers than the agricultural societies. One may pause to wonder why, with the great stretches of the flat lands of the middle west still to be occupied, these men exhibited such determination to make two blades of grass grow where one had grown before, but one cannot doubt that this is what they sought.

The idea that the farmer could and should improve his craft, that he could and should become more productive, also provided much of the justification for the establishment of the agricultural fairs, the founding of farm journals, the establishment of state and federal departments of agriculture, and the land grants for the colleges of agriculture and mechanic arts in 1862.

The colleges of agriculture that came into existence largely in consequence of the Morrill Act had some initial difficulty in finding what to do and how to do it. It was one thing to accept the notion that institutions should be established for agricultural education; it was quite another to find a sensible governing board to devise a course of study aimed at accomplishing the end in view, to hire teachers willing and able to work in that direction, and to find students. A part of this story of early fumbling is well told in Professor Earle D. Ross' book, *Democracy's College*. Despite these early difficulties, including excursions into things like agricultural Greek, the colleges had taken on recognizable form within a couple of decades of their founding. By the end of the 1880's they had devised curriculums that made pretty good sense, contrived the short course, and the farmers institutes. They had also established the experiment station and even obtained, under the Hatch Act of 1887, federal funds to support research at the stations. The experiment station was an invention of high importance. It was an agency that possessed funds with which to hire qualified scientists; in many instances it had a charter directing attention to both basic and applied research; and it possessed a farmer constituency anxious, as one of them put it, to have science brought down out of the sky and hitched to the plow.[2]

---

[1] Rodney H. True, "Early Days of the Albemarle Agricultural Society," in *Annual Report of the American Historical Association for the year 1918* (Washington 1921, 2 vols.), 1:245.

[2] V. Carstensen, "The Genesis of an Experiment Station," *Agr. History*, 34:13-20 (1960).

Although there was no serious attempt to attach economists and farm management experts to the experiment stations at the outset, collection of agricultural data had long been encouraged in the hope that it would be useful to farmers. In the first decade of the 19th century the Massachusetts Agricultural Society had undertaken farm surveys. In 1840 the Bureau of the Census had begun to collect some agricultural data, and the pre–Civil-War cotton planters had considered a number of proposals to collect crop and other information that would be helpful in their marketing and other operations.[3] Moreover, problems of farm management had long attracted attention both abroad and in the U.S. A host of planters, including Washington and Jefferson, pondered these matters and on occasion wrote about them, as did farm editors, clergymen, and many others in the 19th century.[4] Furthermore, economists by the end of the century were exhibiting interest in the economics of agriculture (Thorstein Veblen offered a course of this kind at the University of Chicago in the middle '90's), and men already connected with the colleges of agriculture, mostly agronomists, began to give some attention to farm management and related matters. This was partly a consequence of normal development but it also drew something from the work of Frederick W. Taylor and others —men who sought earnestly all means of increasing industrial efficiency. What could be done for industry, others said, could and should be done for agriculture and even government.[5]

Out of these various and diverse developments came the men who met here at Ames fifty years ago to form the American Farm Management Association. The simple purpose of the Association was "to promote the investigation and teaching of farm management."[6]

The founding and growth of the Association can serve as a crude index of the growth of the profession of agricultural economics. The little Association of 1910 had enough money during the first three years to publish its proceedings each year in a slight eight to ten page pamphlet, which contained the constitution and the program of the annual meeting. By the time of the fourth annual meeting in 1913, funds were available to permit publication of a volume which contained the papers delivered at the annual meetings. In 1918 the Farm Management Association merged with a

---

[3] W. T. Jordan, "Cotton Planters Conventions in the Old South," *J. Southern History*, 19:321-45 (1953).

[4] See, for example, Paul S. Taylor, "Plantation Labor Before the Civil War," *Agr. History*, 28:1-21 (1954).

[5] See Sumner H. Slichter, "Efficiency," *Encyclopedia of Social Sciences*, 5:437-9.

[6] H. C. Taylor and Anne Dewees Taylor list the men actively engaged in promoting the organization in their monumental book, *The Story of Agricultural Economics in the United States, 1840-1932* (Iowa State College Press, Ames, 1952), p. 84. Taylor also has an account of the forming of the Association in the *Journal of Farm Economics*, 4:92-99, 1922. (The *Journal of Farm Economics* will be cited below as *JFE*.)

group of agricultural economists and the Association took on its present name, enlarged its purpose to include the investigation and teaching of agricultural economics, and arranged to launch a quarterly journal in 1919.[7] Only three issues appeared the first year, but the *Journal* thrived. The vigor and prosperity of the new discipline in the next years is impressive. By 1920 there was hardly a college of agriculture that did not have its department of farm management or rural economy or agricultural economics. In 1921 the Bureau of Agricultural Economics was formally established in the United States Department of Agriculture and from the presses came an avalanche of research bulletins, monographs, and books bespeaking the fecundity and vigor of the disciples of this branch of economics. The *Journal of Farm Economics* grew apace. Although a little spindly in its early years, it soon came to justify the faith of its supporters, committed as they seemed to be to the doctrine of the virtue of mere growth. Volume 8 in 1926 exceeded 500 pages, but the editor complained the next year that "a dearth of copy suitable for publication" prevented the 1927 volume from attaining a full five hundred pages. But growth resumed after that drought year and was largely untouched by the depression. In 1937 the annual volume exceeded 1,000 pages and in 1958 it fell just thirty pages short of 2,000. The editor that year reported that only about half the manuscripts offered for publication had been accepted, thus demonstrating that some market control was in effect. Moreover, more than 2,500 individuals were listed on the membership roster by the fiftieth year. If growth in excess of 5 per cent a year is a measure of success, both the Association and the profession it represents can claim unparalleled success.

In my remaining remarks I shall confine myself largely to what I found in the *Proceedings* of the Farm Management Association and the subsequent volumes of the *Journal of Farm Economics.* This material probably does not mirror precisely the accomplishments or reflect in detail the doubts of the profession but it should serve fairly well in both these capacities. No doubt others looking at the same elephant would have seen other things than those I have seen and would have passed over items that have caught and held my attention, but here are some of the impressions I have gathered.

The early work of the men who developed farm management studies and gave them some academic respectability exhibits great vigor, diligence, and ingenuity, but they also illustrate—particularly those who came into the work from agronomy—in a minor way the aphorism that what man learns from history is that man does not learn from history.

[7] A record of the negotiations is included in the minutes of a business meeting, Dec. 1918, *Proc. Eighth Ann. Meeting of the Amer. Farm Management Assoc.*, and in H. C. Taylor, *JFE*, 4:92-99 (1922).

Many contributors to these volumes seem unaware of all the earlier work and thinking about the problems they were considering. This suggests that they avoided libraries with unique success. But the *Proceedings* and the successive issues of the *Journal* show a constant widening and deepening of interest, a perennial and fruitful concern with devising better methodology, and a mounting awareness of the complexity and the ramifications of agricultural economics. It was not until 1922 that the *Journal* reflected much awareness on the part of contributors that the farmers were experiencing acute distress. The extent to which agricultural economists have become increasingly sensitized to contemporary and even future problems is illustrated by the fact that in December, 1941, a prominent part of the program dealt not with the wartime problems of agriculture but with postwar problems. Similarly, awareness of the implications of technological innovation has grown apace. In the early years of the Association, it almost appeared that many individuals were reluctant to acknowledge that the tractor had been invented and there seems to have been a tendency among some to regard it merely as a different kind of horse—one that used kerosene instead of oats. None seemed to have recognized, as Lincoln did in a speech at the Wisconsin State Fair at Milwaukee in 1859, that the development of mechnical motive power as a substitute for animal power would spell enormous changes in farming. Initially there was much more or less self-conscious imitation of the physical and biological scientists. For example, there was for many years, a standing committee on terminology and lines of cleavage, but this passed as the craft developed. No one can examine even a part of the vast scholarly out-pouring of agricultural economists during the past fifty years without being impressed with the enormous productivity, the vigorous growth, and the mounting intellectual sophistication of the guild.

But, having said this, one can wonder whether agricultural economists have been free to do their best possible work. Has support by state and federal government, combined with the demands made by the existence of chronic farm problems since the 1920's, made captives of too many agricultural economists and turned them into either technicians or soothsayers? From the beginning they have agitated for a share of experiment station funds and for additional federal support for their researches.[8] In 1925 the Purnell Act was passed. It provided funds for, among other things, "such economic and sociological investigations as have for their purpose the development and improvement of the rural home and rural life and for printing and disseminating the results of said researches."[9] The Purnell Act, like the Adams Act before it, required that projects sup-

[8] See *JFE*, 2:58 (1920).

[9] Quoted in J. I. Falconer, "Survey of Economic Research Now Being Conducted in Experiment Stations," *JFE* 8:26-32 (1926).

ported by these federal funds be approved by the Office of Experiment Stations. This bureaucratic machinery might not in itself be stultifying, but it must be viewed in the context of the statements of representatives of the Department of Agriculture as to what was proper research. Agricultural economists concerned with projects that aimed at trying to understand the workings of economic institutions in relation to farming got relatively little encouragement. Those who aimed at finding out how to work the system were eagerly sought. Thus in 1926, a member of USDA in discussing the coordination of economic research declared that the main business of agricultural economists was to provide information that would "enable each farmer to obtain the highest possible annual returns and, at the same time, maintain agriculture in a prosperous and healthy balance with the economic activity of other industries. . . . This requires what may be considered as a continuous economic service made applicable to the particular conditions of various crop areas and capable of interpretation by the individual farmer for application to his own farm."[10] H. C. Taylor, on a number of occasions, declared that the business of the agricultural economists was to help the farmer get better prices. In 1929 he said that the battle cry of the farmer was to get a fair share of the national income. "This is the issue then, to which the farm economists must give major attention."[11] A few years later another official declared that much of the research already done was not applicable to present needs. He stated that we can expect "research in agricultural economics and related fields in the future to be so organized that more and more of the results will serve as a basis of action in agricultural adjustment and related fields. This will mean correspondingly less emphasis on what might be called the 'side-of-the-road research;' that is, research carried on in the spirit of one who sits by the side of the road and watches the world go by and confines his analyses and statements to that which has already passed."[12]

Meanwhile there were numerous complaints, some no doubt justified but others merely reflecting unfulfilled aspirations. There was lamentation over what was called the irrelevance of much of the published research and talk about doing more 'basic' or 'fundamental' research. In 1938, M. L. Wilson, then Under Secretary of Agriculture, raised the question of whether the outlook was too limited. "Practically all of us farm economists," he said, "are sons of the soil, graduates of Land Grant Colleges, closely identified with the Federal and State Governments. Without our knowing it, probably our academic liberty and inventive initiative are

[10] Thomas Cooper, "Coordination of Economic Research," *JFE* 9:34-5 (1926).

[11] H. C. Taylor, "The New Farm Economics," *JFE* 11:357-367 (1929). See also *ibid.*, 10:33 ff (1938).

[12] H. R. Tolley, *JFE* 17:37 (1937).

conditioned appreciably by government and public opinion."[13] A year later John D. Black complained that most of the thinking about effective lines of action was coming from outside professional ranks and contended that we still know very little about "agricultural production dynamics and production adjustment."[14] There is also a touch of defensiveness. O. B. Jesness took public exception to the statement by Leonard Ayres that "No other class in the population is so amply provided at public expense with the machinery and trained personnel for carrying forward special pleading." He claimed that agricultural economists were not spokesmen for a special class.[15] A decade later, M. R. Benedict, in discussing social science research in the experiment stations, warned that "If the vision of administrator and researchers is too narrow or too much influenced by the patterns of the past, the research program as a whole will fail to achieve its greatest possibilities."[16] Three years later, W. O. Jones declared, "The agricultural economists, as a group, seem to have a much greater tendency to identify the welfare of the entire society with that of one economic class than have any other group, unless it be the Marxists."[17] This was before a well-known business man testified that the health of the national economy was identified with the health of the company over which he once had presided, otherwise Mr. Jones might have united General Motors, agricultural economists, and Marxists in a startling trinity. In 1954, O. C. Stine, after discussing the mistakes and lessons of the past, declared, "The lesson for all agricultural economists is to *challenge* all assumptions and theories, reformulate them in line with observed facts, and treat them as tools not as masters."[18] Another observer, commenting on the impending changes in the Department of Agriculture the same year, stated bluntly, "To understand the vulnerability of the BAE, one has to appreciate the profound unfriendliness which these organized political forces, both inside and outside the government, can feel for agricultural economics research that does not provide the 'right' answers."[19]

It may be that these quotations represent merely a selective culling of material torn from its context, but to me they suggest some dissatisfaction. It must also be noted in this connection that occasionally large amounts of money have been provided for specific research, as in the case of the abundant provision for marketing research after 1946. The assumption

[13] M. L. Wilson, "New Horizons in Agricultural Economics," *JFE* 20:1 (1938).
[14] John D. Black, *JFE* 21:26-7 (1939).
[15] O. B. Jesness, "Some Fundamentals of Agricultural Policy," *JFE* 20:741 (1938).
[16] Murray R. Benedict, "The Social Sciences in Experiment Station Research," *JFE* 31:264 (1949).
[17] W. O. Jones, "The New Agricultural Economics," *JFE* 34:442 (1952).
[18] O. C. Stine, "Mistakes and Lessons in Agricultural Economics in the Last 25 Years," *JFE* 36:816 (1954).
[19] T. W. Schultz, "Some Guiding Principles in Organizing Agricultural Economics Research," *JFE* 36:18-21 (1954).

was implicit in the appropriation that the farm problem could in large part be solved by improvement of marketing. This might be called the forced feeding or Straussburg goose theory which assumed that all that is needed is better ways to open mouths and betters machines to stuff more food into them.

The mechanisms of project statements, approval by higher authority, authoritative declaration of what is proper research, periodic inspection by officials from the Department of Agriculture who represent a kind of combined inspector general and bank examiner, may have had a limiting, even a stultifying effect upon research. Certainly the source of funds and the arguments advanced to get funds have predisposed the profession in the direction of applied research and may be responsible for those features noted by a European observer some years ago: "A characteristic of American research activity," he declared in discussing agricultural economics, "is respect for the accomplished fact and a predilection for its expression by means of figures."[20]

Other aspects of the *Journal* are somewhat puzzling. Although questions of farm policy provoke heated public controversy, the pages of the *JFE* are relatively tranquil. Only occasionally is the polite calm broken by strident voices of men who disagree and have no intention of homogenizing their differences. Moreover, although the *Journal* runs a very respectable review section, it is strange that the research bulletins and monographs from the experiment stations and the United States Department of Agriculture are seldom reviewed, and when they are it appears as if a nonaggression pact is in existence and is almost universally honored. If, as Carl Becker once said, a professor is a man who thinks otherwise, it strikes me that more of them ought to do so in print.

This leads me to a second and related question. To what extent have agricultural economists failed to challenge basic assumptions and theories? Assumptions that have long dominated almost all considerations of national agricultural policy center on the family farm. It is generally recognized that farming must adjust to changing conditions, but government assistance, whether to provide homesteads, education, research, credit facilities, cooperatives, better marketing arrangements, improvements of tenure conditions, or anything else, is justified and defended on the basis that these actions contribute to the maintenance of the family farm. It is further assumed that what is sometimes called the institution of the family farm contributes to the health and stability of the Republic in such unmistakable terms as to warrant expenditure of vast amounts of public funds with the end in view of protecting, perpetuating and improving it.

[20] Sigmund von Frauendorfer, "Development Methods and Results of Agricultural Economics Research in the United States," *JFE* 10:308 (1928).

The commitment of the politicians and publicists to the asserted virtues of the family farm has been so complete and unwavering as to need no extensive documentation. A few quotations may be used to illustrate what has been repeated thousands of times. In 1908 President Theodore Roosevelt, in a letter to Liberty Hyde Bailey outlining the Country Life Commission, declared: "No nation has ever achieved permanent greatness unless this greatness was based on the well-being of the great farmer class, the men who live on the soil; for it is upon their welfare, material and moral, that the welfare of the rest of the nation ultimately rests."[21] Two years ago, President Eisenhower declared in his farm message that ". . . we must help our farm people to cope with the sometimes harsh consequences of their own unparalleled ability to produce, while preserving and strengthening free enterprise and the family farm."[22] Such views are of course fairly general throughout the Western world. Certainly American public opinion has given them widespread support since the day of Thomas Jefferson. This is reflected in many ways. We at least tried to distribute the public domain in small quantities for family farms. The laws of many of our states forbid corporation farming. From time to time there have been attempts to limit the amount of federal support of one kind or another that a farm can have. Farm machinery manufacturers scale the size of their machinery to small farms. Moreover, even the conduct of business organizations seems in some instances to be controlled by these opinions. In 1955 Mr. F. J. Skogvold summarized the experience of the Equitable Life Assurance Society in handling some 8,700 farms acquired by the company during the depression. The account shows that Equitable made money on the farms, but Skogvold declared that company officials early made the decision that "multiple farm ownership was not a suitable form of investment for an insurance company."[23]

It can be convincingly argued that politicians and publicists who live in the realm of platitudes and clichés have no obligation to explore the content and validity of the beliefs that will get them votes or readers, but can the same be said of agricultural economists? Or could it be said that to the extent they are scholars and social scientists, they had and have an obligation to determine, to the extent possible within the limitations of their ability and their methodology, the validity of the assumptions on which agricultural programs and agricultural policies rest? Was there an obligation to determine whether the family farm could be described and

---

[21] Theodore Roosevelt to Professor Liberty Hyde Bailey, August 10, 1908, *Report of the Commission on Country Life, with introduction by Theodore Roosevelt* (New York, 1911), p. 41.

[22] *New York Times*, Jan. 17, 1958, p. 12.

[23] F. J. Skogvold, "Farm Loans and Farm Management by the Equitable Life Assurance Society in the United States," *Agr. History*, 30: 114 (1955).

if so whether, in a time of fast technological and scientific change, it actually is performing the important and valuable social and political functions ascribed to it?

In December, 1924, E. G. Nourse, in an address before this Association, complained that economists were prisoners of doctrinaire beliefs, that they had canonized the "expediencies" of the British fathers, and that they had sought unsuccessfully to imitate the natural scientists. "Clearly," he declared, "free competition, rational choices, perfect mobility of movement, a population of 'economic men' are not outstanding features of the actual world that has grown up around us."[24] Two years later Nourse, in another paper before this Association, presented a bleak picture of the future of farming. His thesis, which he was at pains to state succinctly, ran as follows: *"The outlook for American agriculture is far from bright, the industry being faced with portentous technological changes while its organization and institutions are such as to make extremely difficult, indeed in large part impossible, a prompt and suitable adjustment to these circumstances.* Stated as a paradox, the outlook for agricultural production is so good that the outlook for agricultural prosperity is distinctly bad." Nourse thought that farming was just beginning to enjoy the benefits of technological and scientific advance. This would result in enormously increased productivity. When he spoke, horses and mules were still providing most of the motive power on American farms; the hybrids, the insecticides and herbicides, artificial insemination, mechanical cotton pickers, corn combines, and hay waferizers were still mostly in the future. On the eve of these explosive changes, Nourse could see little in the organization or institutions of agriculture that would make the necessary adjustments easy or even possible.

Of the economists who commented on his paper, all but one were concerned with whether he had read the future correctly in regard to technology and science and seemed unconcerned or simply not interested in his remarks about the flexibility of agricultural institutions.[25]

In the years that have passed since Nourse presented this analysis, farming has passed from crisis to crisis, through the desperate straits of the early thirties, with the Farm Holiday and the farm strikes, the mortgage foreclosures and the penny sales, to the great so-called "action" programs of the New Deal, the war period, and the years since 1945. The action programs, aimed at harnessing production and stabilizing prices, have sought but have not yet succeeded very well in establishing a kind of publicly controlled agricultural cartel managed by the Department of

[24] E. G. Nourse, "Some Factors in an American Agricultural Policy," *JFE* 7:9 (1925).

[25] E. G. Nourse, "The Outlook for Agriculture," *JFE* 9:21. See also John D. Black, "Agriculture Now," *JFE* 9:137-62.

Agriculture. The Secretary of Agriculture faces problems of much greater complexity and perplexity than would the president of General Motors if Congress constituted its Board of Directors and all of its suppliers could join the stockholders at the annual meetings—or more frequently—to harass the management.

But in this development, it seems to me, little careful analysis has been made to determine whether the family farm is doing what is expected of it, not as a producer of food and fat and fiber, but as the foundation stone of democracy. The *Journal* of this Association contains few articles on the family farm and none that deal with these fundamental assumptions. In 1944 one writer raised the question of whether the family farm was obsolete and answered it with what can only be called a declaration of faith: "Judging by the evident preference of farmers and farm neighborhoods, and the great contributions which these farmers have made to the economic and cultural progress of the region, the family farm should be preserved."[26] Two years later, at an international conference on family farm policy, an official from the Department of Agriculture, himself an agricultural economist, declared that there was no need to spend much time debating whether we want family farms: "The nation is now, and has been from the beginning, definitely and fully committed to the idea that the ownership of land should be in the hands of those who till the soil."[27] On this occasion one well known agricultural economist expressed some doubt that family farms "produce better moral character" than is produced elsewhere and even doubted that the survival of the Republic rested squarely on the survival of the family farm, but the issue was not clearly joined.[28] Indeed, the committee that dealt with the problem of the family farm in the United States at the conference recognized the difficulty of defining a family farm although it started on the assumption that it was one in which the four basic elements of entrepreneurship, land, capital, and labor, all resided within the farm family.[29] But the majority of the committee thought that a family-owned and operated farm could be called a family farm only if it was "large enough, in terms of land, capital, modern technology and other resources to employ the labor resources of the farm family efficiently."[30] Specifically they said that it should have an income of $1,500 or more in 1939 prices.[31] This seems to say that a family farm is a family farm only if it is a profitable commercial farm. It is almost as puzzling to a layman as the term English Public

[26] O. R. Johnson, "The Family Farm," *JFE* 26:529 (1944).
[27] H. R. Tolley in *Family Farm Policy*, Joseph Ackerman and Marshall Harris, eds. (Univ. of Chicago Press, 1947), p. 107.
[28] M. R. Benedict, *ibid.*, p. 128.
[29] *Ibid.*, p. 387.
[30] *Ibid.*, p. 398.
[31] *Ibid.*, p. 389-90.

Schools: they are called English because they teach Latin, public because they are private, and schools because they specialize in games. The editors of the conference report concluded that "specific information on the relative merits of family farms and either larger or smaller units is conspicuously unavailable. . . . This deficiency was felt so keenly that . . . [the committee] observations are of necessity highly tentative in character."[32] In view of the fact that research funds had been available for almost 50 years and our national agricultural policies rest on assumptions about the value of the family farm, this declaration can only be called shocking. In this context it is surprising that A. W. Griswold's book, *Farming and Democracy*, published in 1948, has been largely ignored. One reviewer characterized this volume as a study that "demolishes remorselessly the venerable contention that a large class of small landed proprietors is a necessary foundation of a genuinely democratic society."[33]

But where scholars held back, a farmer could speak with vigor and boldness. In 1872, Dudley W. Adams, an Iowa farmer who would soon become the first national master of the Grange, exhibited his exasperation with those who tried to deceive the farmer into believing he was something special. "Lawyers and doctors," he said, "in beautiful colors paint the nobleness and independence of the farmer's life. They tell us we are the most intelligent, moral, healthy, and industrious class in all the land. . . . Merchants tell us that no business is so sure and free from care as farming, and that in no other calling do so few men end in bankruptcy. Politicians laud in stentorian tones the 'honest yeomanry,' the 'sinews of the land,' the 'bulwarks of our nation's liberties,' the 'coarse blouse of homespun which covers the true and honest heart,' and deluges more of equally fulsome and nauseating stuff. Soft handed agricultural editors give long dissertations on the necessity of saving all spare moments and converting them into useful purpose. . . ." Adams thought farmers should have other objects in mind than everlasting hard work, and that the farm, like any other business pursuit, should provide living and leisure and adequate education for the farmer's children.[34]

Although agricultural economists have exhibited little interest in the family farm as such, they seem to be nibbling it to death. Increasingly the *Journal* has carried articles that suggest the acceptance of the notion that production of food and fiber is much like any other business with many of the same problems and the quite legitimate expectation of adequate monetary rewards. There have been articles on farm management companies, contract farming, input-output studies, labor supply and

[32] *Ibid.*, p. 15.
[33] C. C. Bayley, *Amer. Historical Rev.*, 54:179 (1949).
[34] Quoted in *History of the Grange Movement . . .*, E. W. Martin (pseud. of J. D. McCabe), Philadelphia 1874, p. 520.

wages policies, social security, unemployment insurance and even health insurance plans. Moreover, there is even some evidence that a more direct approach is being made. Last year a member of the Department of Agriculture reported on plans for pioneering research in economics and stated that a group had been established in the Department that would be concerned with "interfirm integration in farming."

It took well over a century for the factory system of manufacturing to be brought to the point where it could and would provide moderately good working conditions and wages. In this development, the cottage industries were destroyed and many ancient crafts disappeared just as completely as those magnificent draft horses we once knew, the Percherons, the Clydesdales and the Belgians disappeared with the coming of the tractors. Agriculture has been in serious crisis for the past four decades. Somewhat reluctantly it has tried to adjust to the rapid changes in technology and science, but I see no reason for assuming that some moderately satisfactory agricultural policy will not be worked out which will permit us to keep the tractors, the experiment stations, the hybrids, and the rest and still not corrode the foundation of the Republic; and, in view of the substantial growth in skill and sophistication of agricultural economists, they may yet make larger contributions toward this end. It may be possible that J. K. Galbraith had something when he declared five years ago that the problem of agriculture "may not be especially intractable. It hasn't been solved because it hasn't yet been attacked."[35]

[35] J. K. Galbraith, "Farm Policy: The Current Position," *JFE* 37:304 (1955).

AN ECONOMIST LOOKS AT THE NEXT FIFTY YEARS OF THE PROFESSION

WILLARD F. MUELLER
University of Wisconsin

PROFESSOR CARSTENSEN has demonstrated convincingly that the problems agricultural economists have worked on and the way they have thought about these problems reflected closely the changing economic environment within which economists practiced their science and art. I approach my assignment today with the conviction that the future direction and complexion of our discipline will depend on the economic and social matrix in which it is practiced in the years ahead. Therefore, I deem it imperative that prior to speculating about the future of our profession, we consider some of the economic forces at work in the world today and likely to emerge during the next 50 years.

The Continuing Impact of Technology on Agriculture

Technological change will be the prime determinant of the complexion of agriculture, as well as of much of the rest of the economy in the decades ahead. Technology will determine or influence (1) the extent to which we remain an economy of abundance, (2) the organization and characteristics of the farm firm, (3) the relative economic position of farm and nonfarm industries, and (4) in a general way the overall economic composition of our society.

If you are willing to concede that developments in technology will influence these factors, you may also agree with me that these developments will directly influence the sorts of problems economists will confront, as well as the environment within which economists attack them.

Much attention has been given to the way in which technological development has generated change in agriculture. In fact, it has become central to most theories of the agricultural problem. Insofar as these theories assume that it is the dynamic quality of technological development in American agriculture which is the root of the agricultural adjustment problem, available empirical evidence, buttressed by reason, suggest that it will continue to be an integral part of the problems of agriculture in the future.

Projections of the anticipated expansion of agricultural output strongly suggest that we cannot expect demand to catch up to supply (at prices farmers consider reasonable) much before 1975. But today we are concerned with an even longer period. Fortunately for my purposes, the United States Department of Agriculture recently made some supply and

demand projections for the year 2010.[1] This study estimates that the domestic utilization of farm products will increase by 140 per cent over the next 50 years, assuming a population growth of 120 per cent and an income growth of 150 per cent. The study projects yield increases up to 1975 by assuming increased adoption of existing technology, and after 1975 by assuming that the annual rate of increase in yields from 1951-53 to the projected 1975 level would continue up to 2010.

This report qualifies its projections admirably. But this much seems certain. If new technology permits agriculture to increase productivity at the rate of recent years, food supplies will be ample with existing land resources unless our population expands beyond 300 million and our exports exceed 152 per cent of 1956. If our population and/or if exports expand more rapidly than this, we will have to increase output through intensifying production on existing cropland or developing additional cropland.

These projections of supply are made on the assumption that because technological advance has proceeded at a certain rate in the past, science will generate sufficient new discoveries to maintain the rates of advance into the future. Obviously, there is nothing to guarantee that the rate of advance of the past will remain the same.

There is no unanimity of agreement among agricultural scientists as to which direction the growth curve will turn. But I will take this opportunity to be recorded among those who expect technological advance affecting agriculture to accelerate rather than remain the same or decelerate. I hold this conviction because of what I believe to be the increasing efficiency of science and the increasing resources likely to be devoted to science in the years ahead.

Scientific inquiry and progress involves a continuing accretion of knowledge. And as the base of fundamental knowledge expands, new discoveries in one field increasingly encourage or permit new discoveries in seemingly unrelated fields. Moreover, developments in one field may increase the efficiency of scientific endeavor in many other fields even though they make no fundamental advances of their own. Apropos our science (and many others) are the recent technological developments in electronic computers. These improvements have probably cut our computing costs by greater relative amounts than farm costs have been cut by any important agricultural innovation during the past half century; moreover, the wonders of modern computers permit us to tackle problems of a dimension which would have caused trepidation among even the most courageous data manipulators of the 1920's. Recent innovations in computer technology promise even further cost reductions. The recent intro-

[1] "A 50-Year Look Ahead at U. S. Agriculture," U. S. Dept. Agr., June 1959.

duction of transisters, better circuits, core storages and magnetic tapes not only have increased speed and capacity but also have reduced maintenance costs. Per unit computation costs on the latest computers are one-third or less of those of computers commonly used just five years ago.

Mr. Robert Salter of the Bureau of Plant Industry expressed a plant scientist's view of the increasing efficiency of science when he said, in speculating on technological advance during the next 50 years, "It is my considered opinion that science has no more than made a beginning in advancing agriculture in the United States. In fact, the big harvest still is ahead. The stage is set with enormous possibilities."[2]

Not only may we expect the efficiency of science to increase, but we almost certainly will increase greatly the resources devoted to research. Since the seeds of basic and applied research may flower in many fields, even research undertaken to get missiles to Mars may affect the applied agricultural sciences. Moreover, even if America devotes relatively fewer of its resources to increasing agricultural productivity, other less favored nations of the world may more than take up this slack. Israel's considerable efforts toward adapting the waters of the sea to crop irrigation is an obvious example. Since scientific knowledge flows freely across international boundaries, expanded research efforts anywhere (including the Soviet Union) may vitally affect American agriculture.

Because of the increasing efficiency of science and the expanded resources devoted to science, I visualize that future scientific developments will be more drastic in their impact on agriculture than in the past. To date, most scientific effort has largely been bent toward improving old ways of doing things. The result has been increased output of essentially the same product by slight modification of traditional techniques. In the years ahead science will not simply tinker with improving the old ways but will replace them entirely with new ways. The impact on agriculture could transcend anything in past experience. Imagine if, instead of discovering how, through breeding and feeding, milk production per cow may be increased, science makes the cow obsolete by replacing her with a machine process.

To date science has caused very little of such displacement of entire production processes and industries in agriculture. Of course, it already has happened in a limited way. Leather for shoe soles has been replaced with plastics and long ago a fairly acceptable substitute for butter was developed. And the General Foods laboratories recently developed a promising (for consumers) synthetic substitute for orange juice.

Of course, agricultural raw materials may still be required in many new production processes and products. But some new products or

[2] Robert Salter, "Note on Technology," *J. Farm Econ.*, Aug. 1950, p. 478.

processes may replace entire agricultural industries, as they are now constituted, rather than simply provide existing firms with means of improving their production processes.

Technological change will be common to all parts of our economy in the decades ahead; however, it will almost certainly continue to cause special problems for agriculture. It is not simply the technological change which causes an industry adjustment problem. Rather, it is the inability of farm firms in a purely competitive market structure to digest these changes in a manner which does not create distress for many firms and, often, hardship for all. After all, many other American industries have experienced during the last two decades technological change of an even more spectacular type than has agriculture. For example, in chemicals entire product lines and even industries are born and die in less than a decade, and productive processes often become obsolete within a few years. These technological changes have not brought about economic ruin, because the firm using the obsolete processes or making the displaced product often is also the innovator responsible for such process and product obsolescence.

It should not be inferred, however, that agricultures' problem with digesting new technology results simply from the supposedly unique *source* of agricultural inventions; that is, the fact that public institutions and industries allied to agriculture, rather than farm firms themselves, make the decisions to conduct research resulting in changes in the production functions of farm firms. This explanation misses the real source of the problem. After all, for the past two decades vast public funds have been channeled into research and development outside of agriculture, primarily, though by no means entirely, in conjunction with our defense efforts. Significantly, in 1959 the $119 million of research funds allocated to the U.S.D.A. (about one-fourth of which went to educational institutions) and the approximately $100 million spent by private firms in the food industries total only about 3 per cent of federal funds allocated for research and development in all fields. The resulting vast research efforts in the biological, medical, physical, mathematical and engineering sciences often have been responsible for inventions and innovations changing the production and demand functions of products in ways surpassing anything experienced by agriculture. But fortunately for the firms involved, and for the rest of us, economic chaos has not been common in the industries affected.

On the contrary, the vast, diversified corporations in the fields most vitally affected possess organizational characteristics and operate in market structures which permit them to adopt new technology, whether internally or externally generated, in a manner which they consider rational. The result is profit tranquillity within a milieu of technological

turbulance. In truth, the very severity of technological change in some industries has created the chief barriers to entry that reinforce the market power of existing firms.

The technological changes discussed above, as well as their differential impacts, will influence directly the organization of agriculture in the decades ahead, and therefore they will affect the problems challenging agricultural economists. I will turn first to some of the probable impacts on agriculture.

The Future Organization and Structure of Agriculture

The most direct impact of technological change during the next half century will be to continue the trend toward encouraging larger farms and larger investments in the farm firm. This increase in size inevitably will be accompanied by a further decline in the number of farm operators. Perhaps we will still have 2.4 million commercial farms in 1975 as conjectured by Professor Black at our proceedings in 1957.[3] But I anticipate that before the year 2000 technological developments will lower the number well under this. Accompanying such further declines will be an immense increase in the capital requirements of the remaining farms. This in turn will encourage the divorcement of farm ownership and management. In those industries where new technology will favor the development of very large firms of essentially a factory type, the divorcement of farm management and labor will become complete.

The market structures (apart from government intervention) most likely to emerge in this new agriculture will depend largely on the extent to which technology favors very large firms. However, I anticipate that for several decades more, and very likely over the next five, most of agriculture will continue to operate in highly competitive market structures.

Based on the experience of other industries, large plant size and large capital investments alone seldom create sufficient barriers to entry to result in noncompetitive market structures. And I doubt whether the chief barriers to entry of other American industries—product differentiation and control of strategic raw materials or patents—will loom important in agriculture in the decades ahead. Consequently, I anticipate that the part of the instability and relatively low income problems in agriculture which may be ascribed to its peculiar market structure will remain. But one very major difference seems likely. With the separation of management and labor, the resulting agricultural problem will shift from being an essentially low labor income problem to a low return on investment problem. (Actually the latter problem is already with us but its extent is obscured by the low labor income problem.) This change will develop because in

[3] John D. Black, "Resources Needed in American Agriculture," *J. Farm Econ.*, Dec. 1957, p. 1083.

those parts of agriculture where ownership, management and labor functions are performed by different persons, agricultural labor mobility will increase, and those remaining as farm laborers will increasingly be protected by minimum wage laws, social security and unemployment compensation, and labor unions. As a result, the main impact of purely competitive agricultural market structures may be on the owner-manager group in agriculture.

I anticipate that technological and market forces will bring about a parallel, if less dramatic, impact on the structure and organization of the agricultural supply and marketing industries; within another three decades the structures and organization of these industries will be quite similar to those possessed today by the major nonfood manufacturing industries in our economy.

So much for my speculations about some of the impacts of technological change on the agricultural industries. I will now turn to the question of how these and other changing characteristics of agriculture and our environment will affect the demand for agricultural economists in the decades ahead.

A Declining Demand for Agricultural Economists?

The intensity of farmers' problems and the degree of public sensitivity to these problems, more than anything else, has been responsible for the extensive resources devoted to agricultural economics as a special area of study. The way in which these resources have been allocated has shaped the dimensions of our research efforts. The Agricultural Marketing Act of 1946 and subsequent appropriations for work in marketing is a leading example of this. As Professor Carstensen's paper suggests, the supply of agricultural economists is very elastic and the supply response is rapid—at least during times of growing demand.

But as farm numbers decline, farm size increases, and farm labor incomes rise, the public's generous support for agricultural economics research and extension almost certainly will wane. The tendency to treat agriculture no longer as a special case when it comes to subsidizing economic service research and extension programs probably will result mainly from the declining political position of agriculture. But I think the purely economic case for such special treatment also will diminish. After all, as farms become large and are run by professional management personnel and are given expert information and assistance from their suppliers and customers, they need no longer be administered to by publicly paid persons. And where the separation of agricultural labor and ownership becomes complete, the problems of agricultural labor will become the legitimate concern of labor economists and the Department of Labor. As these things come to pass, it will perhaps be possible to build a legitimate case

only for subsidizing basic and applied research into the fundamental economic processes related to agriculture. And I suspect the marginal efficiency of research efforts devoted to economic problems outside of agriculture, as well as those devoted to the other social and physical sciences, will be such that a relative reduction in agricultural economics research will be justified.

Whether the result will be a relative or absolute decline in the numbers engaged in our craft will depend in part on the areas of research, extension and teaching which we and our administrators define as being part of our concern. Much will depend on whether agricultural economists can perform useful extension and service research in the farm supply and marketing industries. This, in turn, will depend on the organization and structure of these industries. But I seriously doubt whether, after a few more decades of structural change in these industries, research and extension personnel are going to have much to offer them (unless they go to work for them). Certainly, even today large firms such as A & P, Kraft, or General Foods are not looking to our research and extension persons for help; in fact, I suspect that these and other large firms only tolerate us because they think we are quite harmless as long as we do not carry any of their trade secrets to their smaller rivals or to antitrust agencies.

In the future the agricultural supply, processing and distributing industries will be more like chemicals, autos and steel, and when they achieve such a status the need and justification for publicly subsidized service research and extension activities in these fields will largely disappear. If this happens, it will decrease the demand for agricultural economists as a special breed of economists. Then, as in the case of agriculture, only research into basic economic processes will be justified; and the food industries will have little to commend them as being unique areas warranting special public attention—especially as increasing affluence makes food relatively less important.

Another factor affecting adversely the demand for agricultural economists will be the continuing decline in undergraduate enrollments in our agriculture colleges. I anticipate that during the 1960's many more departments will attempt to expand the demand for their services by initiating special curricula in agricultural business. Let us not kid ourselves into believing that by turning ourselves into departments of business administration we can preserve the demand for agricultural economists. We may increase the quantity of people labeled as agricultural economists but this will almost certainly erode the professional stature of our discipline. I cannot imagine that the environment of an agricultural business school will encourage the flowering of a generation of scholars comparable to those of the last two generations.

The efforts of economists to expand the demand for their services in

this and other ways may well reach a peak during the late 1960's. In succeeding decades, however, it will become increasingly apparent that the problems which agricultural economists work on are not sufficiently unique and important to warrant separate departments of agricultural economics any more than separate departments of automobile or chemical economics are warranted today. Therefore, I anticipate that where agricultural economics departments operate as separate units, today, many will become fully integrated with general economics departments in the decades ahead. (Of course, some of our profession's leading scholars have always come from such departments, and many of our departments are becoming increasingly integrated on an informal basis.) Some of the farm management and marketing workers might find a more comfortable home in schools of commerce than in economics.

I anticipate a similar integration of agricultural extension and general extension activities; of course, because many extension workers are essentially researchers, they might most appropriately be absorbed by general economics or commerce departments. And many in that growing troop of crusaders in consumer education might be conveniently merged entirely with home economics.

Should the demand for agricultural economists decline in the future, it could create a difficult adjustment problem for many in our profession. The tight supply and demand situation of the past two decades, resulting from the perhaps overgenerous infusion of public funds into our field, has induced a large supply response in graduate students and staff. This expansion will carry well into the 1960's, and might result in a surplus situation by the mid-70's. But insofar as we turn out well trained economists, not just specialists equipped to work on some aspects of current agricultural "research," I am confident that the young men entering the profession during the years ahead will possess sufficient mobility to migrate out of agricultural economics should it become a declining industry.

A not to be neglected dimension of the future demand for agricultural economists is the need for their services in the less developed economies of the world. This may well be the last frontier of agricultural economics as it was practiced during much of its first half century.

In much of the world, economic growth will continue to run a desperate race with population expansion. I am sure that agricultural economists will continue to be called upon to help civilization win this race. This will require well-trained agricultural economists. American universities have an opportunity and obligation to train at least some of these persons. Often the demand will not be for sophisticated manipulators of masses of agricultural data nor rigorous developers of theoretical tools. Rather, there will be a demand for the sort of service research and intimate assistance given many American farm and marketing people by

publicly supported economists over the past half century. Hence, while the demand for this sort of economist may decline in the United States, a great expansion may occur abroad. So viewed from its international perspective, the character of our profession will change much less than it will in the United States and some other western countries.

Another factor which may bolster the demand for bona fide agricultural economists is the likelihood that public programs concerned with agriculture will increase in the decades ahead. These programs may vary from quite rigid supply control programs to market order programs concerned only with market promotion. Regardless of whether these programs are controlled and operated entirely by government agencies or by the industries themselves, such cartel-like programs will require the help of a great many economists.

Thus, there will be opposing forces at work affecting the future demand for agricultural economists. What their net effect will be is not certain. But certainly the demand for our services will not expand at the rate of the last 50 years.

The Future Work of Our Profession

Professor Viner once said, "Economics is what economists do." Whether we like this definition or not, it is by our deeds that our profession is judged. And unhappily, the deeds of many of us do not possess the quality which inspires either professional self-respect or admiration from others for our profession; to do so our profession must aspire to a loftier scientific purpose than has characterized so much of its past performance.

Professor Schultz, who has always been among those to stir the conscience of our profession, captured the source of much of our difficulty when he said, "There is altogether too strong an accent on routine work. Service work is placed on a pedestal. Little time is left to get down to dig, to think, and to undertake really difficult and worthwhile studies. There is very much a danger that what emerges is 'well organized routine.' "[4]

Too much of our research is fragmented, is only statewide (or less) in scope, and is dictated by service needs. The familiar result is that most research adds nothing to our fund of verified knowledge. Such performance has not been good enough in the past and certainly will not be acceptable in the future. The most compelling future demands for our services will be in analysis of fundamental economic processes. And to be most effective our researchers must devote their energies to particular problems without the interruptions of everyday routine. Their obligation should be to develop integrated research programs directed toward the

[4] Reported by L. L. Boger in: "Important Professional Problems Facing the Agricultural Economist," *J. Farm Econ.*, May 1954, p. 306.

steady accretion of scientific knowledge, rather than to simply preside over a miscellaneous assortment of projects.

The priority of our research efforts inevitably will change in the decades ahead. In conclusion I wish to cite several problem areas which should be given high priority for some time to come. I take little credit for the originality of the problem areas discussed below; nor do I pretend that these areas even begin to exhaust the important problems challenging us in the next five decades. And although I shall not speak specifically about internationally oriented problems, all the problems I do mention inevitably will be intertwined in some way with international affairs.

My list of problem areas inevitably reflects my peculiar experiences and preconceptions of what is important. For a somewhat longer list of problem areas and suggested approaches to their solution, I recommend the recent article by Messrs. Brinegar, Bachman and Southworth.[5]

The promise that technological advance will continue to cause special problems for agriculture, because of the character of its demand and unique market structure, inevitably assures inquiry into the processes of agricultural adjustment a prominent place in our future researches. Obtaining reliable knowledge of the fundamental processes involved will require a blending of the efforts of researchers in farm management, marketing and prices, and the utilization of all the tools accessible to our science. Only by theoretically unraveling and empirically measuring fundamental relationships can programs be formulated which will permit our technologically created abundance to be diffused equitably without resulting in rigidities which interfere seriously with the very processes generating this abundance.

An especially critical part of this inquiry will involve analysis of alternative agricultural policies, including laissez faire, to predict their implications for farms of different size, producing different products, and located in different regions, and for marketing firms, consumers, and international markets. To date nearly all efforts at policy analysis have been too fragmented to give farmers and policy makers much faith in our profession. Recent forays into this area suggest that we do have the capacity to make some fundamental contributions here.

Another vast area demanding critical analysis is the industrial organization of the American economy and the unique place of agriculture in it. General economists have devoted considerable study to the organization and performance of industries with various market structures. These studies suggest that most American industries operate tolerably well in spite of, and perhaps because of, their considerable departure from purely

[5] George K. Brinegar, Kenneth L. Bachman, and Herman M. Southworth, "Reorientations in Research in Agricultural Economics," *J. Farm Econ.*, Aug. 1959, pp. 600-19.

competitive market structures. (Of course, in coming to these conclusions economists have resorted to the less exacting norm of workable or effective competition, rather than perfect competition.) But actually very little is known about the income distribution and other implications of having purely competitive market structures generate performance in one part of our economy and monopolistically competitive structures generate the performance of the remainder. Our theory on this matter leaves much unexplained because it abstracts from a world of rapid change. This area will deserve increasing theoretical and empirical exploration in the decades ahead, as the industrial organization of our economy is further transformed.

A third area which should be given high priority by our profession is that of rural-urban development and planning. The 1960 census reported that one-third of our population lives in suburbia. This statistic dramatizes the emergence of a new pattern of rural-urban living. But unhappily, this pattern is often without intelligent design. It has emerged, in large part, in an unplanned and uncoordinated manner, with the result that public wealth is depressed by our affluence in private wealth. Closely allied to this development has been the mushrooming demand for recreational facilities. Too often the response to this demand has been congestion and ugliness.

These developments have increased considerably the competition among the alternative users of our national resources. And the past performance of the market place as an adequate allocator of these resources does not commend it highly for the future. The growing competition for *lebensraum* among potential agricultural, recreational, urban, and industrial users of these resources will create economic and social problems beyond present comprehension as our population expands beyond 300 million and annual gross national product exceeds two trillion dollars. The magnitude of the problems certain to emerge in this area offer economists one of their greatest challenges in the decades ahead. This clearly is an area into which more of our professional resources should be channeled.

In closing I want to commend a final challenge to our profession, the analysis of goals and values. The recent conference on goals and values sponsored by the Center for Agricultural Adjustment was a commendable beginning. Hopefully, this beginning will encourage more interest in this largely neglected corner of our discipline.

Economists can do much toward identifying and untangling the economic factors, and perhaps even some noneconomic ones, which influence the attitudes, opinions and goals held by farm and nonfarm people, as well as the intensity with which they are held. Much of this analysis can be done (and, whenever possible, should be done) entirely within the domain of positive economics.

But I do not intend to leave the impression that economists should steer a cautious course designed to avoid the great normative issues relevant to the future economic and social organization of our society. Certainly the preservation of our free society and the fullest achievement of its creative potentialities transcends any of the economic problems I have mentioned.

If academic economists are to attain a position of leadership and respect in the intellectual community, they should take a hand in identifying and articulating public values leading to the good life; they should help man to use his increasing control over environment to generate happiness rather than pleasure, national greatness rather than national decadence, international understanding and peace rather than international suspicion and devastation. I appreciate fully that by tolerating and, perhaps, even encouraging some in our ranks to take a hand in molding the public conscience, we may jeopardize the pure, scientific status of our profession. But if we avoid this area of intellectual expression in the interests of scientific purity, society, as well as our profession, will be the loser.

IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON UNDERDEVELOPED ECONOMIES

CHAIRMAN: JAMES G. MADDOX, NORTH CAROLINA STATE COLLEGE

VALUE OF U.S. FARM SURPLUSES TO UNDERDEVELOPED COUNTRIES*

THEODORE W. SCHULTZ
The University of Chicago

THE American perspective on farm surplus disposal seems to take this form: U.S. farm surpluses are a fact of life, they must be disposed of, and the natural place is abroad. Particular underdeveloped countries need these farm surpluses and they need them above all for their economic development; thus, the thing to do is to place them in the hands of the governments of such countries. But private and public motives for disposing of these surpluses are not so clear or cogent. Many a citizen who is motivated by deeply held humanitarian values is far from happy knowing that there are millions of people in the world with all too little food and that his country is beset by a wasteful abundance. What is simpler and more just than to share our abundance? There are some who speak for farm groups who know that these disposal programs are essential to maintain the existing farm policy; their motives are not wholly altruistic. The lot of legislators who enact the law and of public officials who administer Public Law 480 is not an easy one; their choices are shaped by many conflicting pressures, and they are bound by various policy, legal and technical considerations.

I propose not to dwell either on the aspirations or on the underlying beliefs and values of Americans related to this issue, but on costs and returns related to P.L. 480.

Although I accepted the invitation to prepare this paper with alacrity, I realized then and more poignantly later how difficult it is to discuss this topic and not be misunderstood. It may help to be explicit about these difficulties. No one can blink the fact that the farm surpluses have become vast, nor have they been shrinking. Not so long ago when CCC stocks were still small and still had some connection with supply and demand contingencies, it was the "ever normal granary." Now, however,

* In revising this paper I have benefited much from a number of critical comments and substantive data and studies that I received from Mordecai Ezekiel, Dale E. Hathaway, Bartlett Harvey, Harry G. Johnson, Sherman E. Johnson, Edward Mason, Don Paarlberg, Herbert Stein, Lauren K. Soth, Walter W. Wilcox and Lawrence Witt. None of them, however, should be burdened with any of the limitations of this paper.

the prophecy of G. F. Warren has been fulfilled: "a granary easy to fill but impossible to empty"! The more farm surplus we dispose of the larger the remaining surplus becomes! Thus we have invented still another tread mill.

One question can be disposed of promptly: Can the United States solve its farm surplus problem by bigger and better disposal programs? Here I fully concur in the negative answer given by Professor Cochrane in his presidential address a year ago. But on the question: Are these disposal measures a necessary and integral part of comprehensive supply controls (a better term would be "rationing agricultural production")? he was of the view that "they fit hand in glove and should be married forthwith." Some may both nod and wink at so convenient a marriage. But are the pair so happily matched as all that? If these rationing measures can control production there need be no surplus whatsoever. Farm surpluses would disappear *unless we wanted them,* and that would be quite another matter.

These surpluses have not sprung out of the vagaries of weather or out of fluctuations in demand, nor have they been caused by the slow economic growth of poor countries. They have been a conspicuous consequence of U.S. technological and price policies, and the solution lies in alternative policies to those now in effect. And here I do not rule out "comprehensive supply controls," although I remain skeptical that such controls are politically feasible—not because of an unwillingness of government to try them, but because of their adverse welfare effects and because the public and private costs would be too high to be tolerated politically.

It is easy to rationalize our farm surpluses into international assets. But in doing so, we deceive no one but ourselves. We can go on making a virtue of them, but thoughtful people and informed leaders abroad are not deceived by what we say; they see clearly that we have been making our foreign economic policy fit our internal convenience.

I hold, as do many Americans, that the United States should do much more than it is doing presently to reduce the inequalities in income among the peoples of the world. Whether such a position is based on humanitarian benevolence, utilitarianism, or a long run self-interest raises issues that are not easy to untangle by simple introspection. Lend Lease and the Marshall Plan had special merit under the circumstances of the time. But there is now no Marshall Plan, so we settle for P.L. 480. It is said that whereas the American people wish to do much more to assist underdeveloped countries increase their national income, Congress sees it otherwise and thus Congress on this issue does not represent the will of the people. The argument then proceeds, since a Marshall Plan for poor countries cannot be enacted, and since Congress must cope with

farm surpluses, the disposal of these surpluses abroad permits the American people to contribute more than would otherwise be possible, given the unwillingness of Congress to act directly and decisively in providing U.S. resources for underdeveloped countries. I am not at all impressed by this line of reasoning. On the contrary, one of the major obstacles standing in the way of the United States doing more to assist poor countries is the widely held belief that military aid is good economic assistance and that U.S. farm surpluses are a powerful resource for economic growth in the underdeveloped countries that receive them. Meanwhile, we are drifting ever further into an unsatisfactory farm and foreign economic policy, and in the process fail to live up to the will of those Americans who really wish to assist underdeveloped countries win a larger national income.

The reason why I entered into a rather long discussion of the unsatisfactory state of U.S. farm policy in the preface of this paper, was to make explicit my misgivings about any treatment that assumes that the United States does not have better agricultural policy alternatives.

So much then by way of a preface. In the rest of this paper, I propose to examine three related questions: (1) What is the value of P.L. 480 products to countries receiving them, relative to U.S. costs? (2) What do these countries "pay" us for P.L. 480 products? (3) What are the effects of P.L. 480 farm products upon the agriculture of the countries that receive them?[1]

I. *Costs and Value of P.L. 480 Products*

CCC costs are more than twice the value of these products to the recipient countries. Yet, in terms of marginal revenue foregone from foreign sales of U.S. farm products, if we treat our farm program and production as given,[2] the cost to us is much less than the value of these products to the countries receiving them; costs to us, treated thus, may be zero.

What, then, are the costs to us of P.L. 480 products? (1) There is a set of costs for which appropriations are made to reimburse CCC. (2) There is another set of costs based on considerations of marginal revenue. To get at these we need to consider what would be the marginal revenue to total U.S. export earnings from agriculture if P.L. 480 products were sold abroad.

---

[1] P.L. 480 is performed under two small tents and one big one (a fourth tent was added in September 1959, but it still stands empty). Under Title II, donations are made to meet famine and other extraordinary relief needs, and under Title III there are barter transactions and donations to nonprofit agencies engaged in distributing such products in foreign countries.

[2] I am indebted to Herbert Stein for raising this issue of "revenue foregone."

Altogether, over $9 billion have been authorized for Title I of P.L. 480.[3] These are dollars to reimburse CCC for its "sales" under this title. CCC costs, however, include many expenditures that do not add to the value of these products to India, Pakistan or to other such countries receiving P.L. 480 products. As a first approximation, I shall take the difference between CCC costs, which are covered by U.S. appropriations, and the "export market value." By this criterion, about 30 cents of each dollar of CCC costs consists of such expenditures.[4] The next step entails an adjustment to world market values.

This export market value is based mainly on world market prices at which the U.S. has been prepared to sell. It would have been substantially lower had the U.S. sold all of its exportable farm surpluses freely at whatever world prices they would have fetched. There are various ways of gauging what such a world price would have been, but at best it would be a guess. My guess is that it would have been in the neighborhood of one half of CCC costs.

What about the marginal revenue test? P.L. 480 exports have been about 27 per cent of all U.S. exports of farm products. Suppose that there had been no P.L. 480 exports and that all P.L. 480 farm products had entered world markets and had been sold along with the other U.S. exports of farm products, would the total U.S. export earnings from agriculture have been larger than it has been? Inasmuch as wheat and wheat flour have accounted for about half of all P.L. 480 exports, and given the "low price elasticity" of the world demand for wheat, it is hard to believe that the marginal revenue from such additional U.S. exports (taking all P.L. 480 farm products) would have been positive.[5] This view of costs implies that countries like the U.K. that have been importers (e.g. of wheat) have paid a higher price than they would have had we sold P.L. 480 wheat to the highest bidder in world markets. Also, if free world market sales had been the alternative, and if one is prepared to treat U.S. farm programs and agricultural production as *given*, then even Canada and other countries that export these farm products have "benefitted" from P.L. 480!

[3] The first authorization made on July 10, 1954, was for $700 million. By September 21, 1959, the accumulated total of these authorizations had become $9,250 millions.

[4] In all agreements signed between July 1954 and Dec. 31, 1959, the estimated CCC costs under Title I were $5,351 and the "export market value" was $3,719 million. For agreements signed between July and December, 1959, these estimates were $601 and $387 millions respectively. See House Doc. No. 335, 86th Cong., 2nd Ses., Feb. 11, 1960, Washington, D.C., Tables I and II.

[5] This result is not inconsistent with the cost-price relationships as I have treated them above. Take CCC costs equal to 100 per unit of P. L. 480 products and 70 as the "export market value." U.S. exports of farm products consisted of two parts: 27 per cent through P.L. 480 and 73 per cent, the other such exports. If the 73 per cent sold at 70, we have 5,110 and if all had been sold at 50, we have 5,000, or a total revenue that is actually slightly less.

Let me now consider the value of P.L. 480 products to the recipient countries. Here, a first approximation would be the value to them at free world prices, or at about half of CCC costs. This estimate, however, would be too high because these particular countries would not have purchased as large a quantity of U.S. farm products at free world prices as they have acquired under P.L. 480. If these underdeveloped countries had had a choice of receiving from the United States either dollars or farm products of equivalent value at world prices, they would with few exceptions have preferred to have the dollars because the dollars would have been worth more to them in achieving economic growth or in serving other purposes that they ranked high among their national goals. If they had received dollars they would have used some of them to acquire producer goods, although no doubt many U.S. farm products would also have been taken, as was the experience under the Marshall Plan. To illustrate, suppose that India were given a choice of either $1 billion of U.S. farm products at world prices or 750 millions in unrestricted dollars. I believe that the government of India would prefer the dollars.[6] P.L. 480 farm products have been worth less to the countries that have received them than the value of such products would have been at free world market prices.

Let me close this section with a brief summary:

(1) CCC costs of P.L. 480 products appear to me to have been in the neighborhood of twice the value of these products had they been sold freely in world markets.

(2) Costs to the United States of P.L. 480 products measured in terms of marginal revenue foregone from foreign sales may have been zero, provided we treat our farm programs and agricultural production as a constant.

(3) The value of P.L. 480 products to the countries receiving them has perhaps been about 37 cents for each dollar of CCC costs.

(4) Accordingly, under conditions set forth in (2) and (3) above, there is a substantial range for negotiating P.L. 480 transactions, inasmuch as the value to the recipient countries is about 37 cents per dollar of CCC costs and the cost to us in earnings foregone may be zero, on the shaky assumption that we will not improve on our agricultural policies.

(5) It is a serious misconception to treat all P.L. 480 appropriations to cover CCC costs as if these were a valid measure of the true value of these farm products to the underdeveloped countries receiving them.

---

[6] A highly placed Indian economist in private discussion rated 500 millions in unrestricted dollars as more valuable to India than a billion dollars of P.L. 480 farm products; on the other side, one of our best informed American agricultural economists is convinced that food imports have a high priority in the development program of India, implying that dollars for P.L. 480 products were fully as valuable as dollars made available to India without restriction.

Half or more are simply a consequence of our farm programs. It is also misleading to treat all CCC costs as a "charge" against agriculture because some of these costs represent resources of substantial value to the receiving countries and this part should be treated as "foreign economic aid" or as items for which the U.S. government is paid by the countries receiving P.L. 480 products.

II. *What Do Countries Receiving P.L. 480 Farm Products Pay for Them?*

When the foreign currency accounts are once settled, the payment will be, as I read the record, somewhere between 10 and 15 cents per dollar of the CCC costs. Agreements under Title I are sales for foreign currencies. Here "the U.S. attempts to obtain maximum dollar return to the CCC for sales from foreign currencies . . . for Embassy expenses, procurement of housing for military dependent personnel . . . ," and for more than a baker's dozen of other purposes authorized under section 104(a) through (r) of Title I (and more are being added). Precisely how these sales are treated in any particular negotiation is a matter of law, of bargaining capacities, and of convenience, about which the U.S. government is not so clear that one can see it with half an eye; the legislative mandate on which P.L. 480 rests is not a little deceptive.

There is an ample supply of difficulties. The whole affair is beset by a money illusion based on the belief that all foreign currencies are like dollars. There is the misconception that loans in foreign currencies can solve the problem of large balances of U.S. owned foreign currencies in particular countries, although loans in such cases only postpone facing up to an unhealthy situation where they already are a small cloud menacing our relationships with some of these countries. There is no clear conception of the interrelationships between U.S. internal affairs and U.S. external policy objectives.

Much confusion also stems from the essentially *unintegrated* nature of the U.S. government. Many different agencies become involved, each with its particular domain based partly on its unique relationship to the executive, partly on its relationship to one or more subcommittees of Congress, and partly on its competence, prestige and desire to become more important. The Department of Agriculture is driven to enlarge the surplus disposal opportunities abroad, to transfer the farm products so as not to interfere with the normal U.S. market channels, to acquire foreign currencies to develop farm markets, hold agricultural fairs and engage in some types of research in these countries. The all-pervasive quest for national security gives the Pentagon much leverage to use P.L. 480 funds for military aid. The Treasury insists on a banking and fiscal concept and

presses for loans and a performance befitting hard money, and is joined by the Bureau of Budget demanding a stern fiscal procedure. The Development Loan Fund, although weak, is geared to soft money and the existing foreign currency mess. Some U.S. agencies wish to acquire office buildings and exhibition grounds abroad. Funds are authorized for student exchanges, suitcase scholars, U.S. sponsored schools, publications, bi-national centers and for still other activities assigned to the Library of Congress and the National Science Foundation. The Export-Import Bank administers the Cooley loans using some of the P.L. 480 foreign currencies to promulgate the American heritage of private enterprise. Meanwhile, the Department of State conducts the sales negotiations and is basically concerned about the foreign policy implications of P.L. 480, i.e. impact on competing exporters and impacts via foreign currencies; but it is much buffetted about. One sees this throughout the Congressional Hearings. To cite one bit of legislative history, the Hon. Harold D. Cooley, chairman of the Committee on Agriculture of the House, "instructed" a representative of the Department of State as follows: "We are primarily interested in getting rid of these surpluses and we don't care how you do it and under what authority. We have told you we want the commodities sold for dollars first and then for foreign currencies or then donate them."[7]

I do not wish to imply that all of these many desperate purposes and activities are undesirable, or that these agencies are beset by irresponsible people; not at all. My purpose here is to reveal some of the roots of the widespread confusion that characterizes the administration of these disposal programs, whether one examines them from the vantage point of Washington or from New Delhi or any other foreign capital in a country receiving P.L. 480 farm products.

To return to the question, what is paid? The Bureau of the Budget reports that through September 15, 1959, the cumulative sales agreements under Title I had a total value of $4 billions.[8] Of this the Department of Agriculture had $27 millions for utilization research and $35 millions for market development and agricultural fairs. I would treat the first of these as serving the receiving countries (although those who sponsor it would treat it otherwise) and the second item as serving our special interest and thus the latter is a "payment" to us. The Department of State had $44 millions for educational exchanges and $8 millions for

[7] Hearings before the Com. on Agr., House of Repr., *Extension of Public Law 480* Ser. X, July 15, 1959, page 207.

[8] See Bureau of the Budget, Special Analysis E, "Foreign Currency Availabilities and Uses," pp. 925-35, *Budget of the United States Government for the Fiscal Year Ending June 30, 1960*, tables 7, 8 and 9.

American sponsored schools; both of these serve mainly the receiving countries (the $44 millions could be treated 50-50). The U.S. Information Agency had $7 millions for publication and $5 millions for bi-national centers. Whether these serve mainly the United States or the receiving countries is for me an open question. The Department of Defense had $113 millions for military family housing; this item may be treated as a payment to us. $45 millions appear for exports to third countries and these belong under payments. Assuming now that half of the Information Agency figures are for us, this list of "payments" totals about $200 millions. The common defense column shows $328 millions, nearly all in Korea, Pakistan, Turkey, Formosa, Spain and Vietnam. Allocations and reservations for Treasury uses are $6 millions for scientific activity which I assume serve the receiving countries, and $594 millions for general expenses, a substantial part of which is book credit concentrated in a few countries—Spain, India, Turkey, Yugoslavia and Pakistan—where they have little prospective value for us.

Altogether, then, for the $4 billions of foreign currencies I would treat at most between $700-$800 millions as "payments"; moreover, this estimate is undoubtedly on the high side because most of these foreign currencies are accumulating in a few countries where they will have little value to us under the realities that confront these countries.

It is indeed a serious misconception to treat the vast sums of foreign currencies that have been deposited and are being deposited to the account of the U.S. Embassies abroad as if they were hard money that will eventually be converted into dollars, if only we manage to hold onto them, through loans of various sorts within the countries concerned. It is high time that the United States adopt a policy of reducing very substantially these exceedingly large balances of U.S. owned foreign currencies. I would support the recommendation that when a U.S. balance held in any country exceeds the foreseeable needs of the United States in that currency for the next two or three years, the United States should treat the remainder as a "surplus" and proceed to transfer it to the country as a grant.

Thus, the key "estimates" on which the reasoning in Sections I and II rests are as follows:

	Millions of dollars	Percent of CCC costs (5700=100)
1. If CCC costs of P.L. 480 products were	5,700	100
2. Sales for foreign currencies become	4,000	70
3. Value at world market prices equals	2,850	50
4. Value to receiving countries	2,110	37
5. Upper estimate of what the U.S. will receive	855	15
6. Lower estimate of such receipts	570	10

III. *What are the Effects of P.L. 480 Products Upon the Countries Receiving Them?*

P.L. 480 increases the quantity of resources at the command of the countries that receive them. To this extent the country is better off. A measure of this over-all gain, according to my "estimates," is that $5.7 billions of CCC costs adds $2.1 billions of real resources to those of the countries that receive P.L. 480 products, and if ultimately they pay at the lower limit of my estimates, the net addition to their resources will be somewhat more than $1.5 billions.

Conceivably, at one extreme, circumstances could be such that internal consumption would increase by an amount that is virtually equal to the flow of P.L. 480 farm products, and at the other extreme, it could be that virtually all of these are transformed into "savings" and additional capital formation. A number of things could be done by means of internal programs to turn the process in favor of additional consumption or towards capital formation. But what is happening on this score is far from easy to determine. I would venture the guess that real income of consumers rises somewhat as a consequence of the availability of P.L. 480 farm products and that they increase their saving by as much as 10 per cent or more of the rise in their real income, and that in a few countries, for example, in India, the increase in the intake of food also acts as a kind of "producer good" in enhancing the energy and strength and thereby the amount of productive work that is done. All of these effects would seem to be desirable in serving positively both consumption and productivity.

But what are the effects of P.L. 480 imports upon agriculture? Here we can do no more than speculate about what is plausible. Unfortunately, there are few data and no relevant studies.[9] What these effects have been seems to be "nobody's business." In all of the hearings before U.S. Congressional Committees and in the statements and reports of the executive branches, I have found no serious considerations of this aspect of P.L. 480 operations. There are only pious words bespeaking the many virtues of economic growth.

---

[9] I am not unmindful of such studies as *Uses of Agricultural Surpluses to Finance Economic Development in Under-Developed Countries,* Food and Agriculture Organization of the United Nations, Commodity Policy Studies No. 6, 1955 and 1958. This study analyzes the effects of particular hypothetical uses of such surpluses; it does not attempt to determine the economic consequences, for example in India, of the ways in which India has in fact absorbed and utilized the P.L. 480 products that it has been receiving. What has been happening bears little or no resemblance, as far as I can tell, to the assumption on which this study is based. Dr. Mordecai Ezekiel in his paper "Apparent Results in Using Surplus Food for Financing Economic Development," *J. Farm Econ.*, Vol. XL, Nov. 1958, also stresses the fact that the fragmentary data available for India and Pakistan give "no clear-cut picture of the effects of Public Law 480 shipments on economic development." See p. 918.

What we do know is that U.S. policy concerning the use of P.L. 480 loans and grants is set against agriculture in the receiving countries. Uses of P.L. 480 foreign currencies that would increase the export availability of surplus farm commodities are virtually prohibited, and so are investments that would significantly increase the production of surplus farm commodities other than food and feed.

As things are going, the effects of P.L. 480 imports upon agriculture are likely to be adverse. Here, however, each country has a policy choice. A country may decide that her agriculture represents only a second best, or less than this, among the major sectors in what each can contribute to her economic growth. If that is so, my comments are not relevant. If, however, it is to the best long-run interest of a country receiving P.L. 480 products to expand her agricultural production along with growth of her industry, then my observations have a bearing. Let me assume that a country absorbs a substantial volume of P.L. 480 farm products, that they are a grant, so that no payments are made for them, and that the country purchases and imports the same quantities of comparable farm products as formerly, as specified in the P.L. 480 agreement under which she received U.S. farm products. Assume, further, that there are no close substitutes either in consumption or production within the country. Under these assumptions, take the recently announced P.L. 480 agreement with India, which apparently will provide a stream of U.S. farm food product equal to 6 per cent[10] of her domestic production of food. Imports of food from other countries continue at the same rate as before; also, imports formerly purchased from the United States are maintained as before. A price elasticity of the demand for farm foods of no less than unity, implies a reduction of farm food prices of 6 per cent, which will be offset somewhat by the income effects of the rise in real income associated with the receipts of P.L. 480 grants. Clearly, if these were the consequences, nonfarm consumers would be better off. Cultivators in India, however, would be confronted by some decline in the relative prices of the farm products they produce and sell. Here, too, there would be an income effect reducing their consumption. The incentive to maintain or expand agricultural production would have taken the wrong turn.

The climate of opinion presently is such that it is all too convenient to sweep these potentially adverse effects on agriculture under the rug. Most of the leaders of thought and of public affairs in underdeveloped countries are pinning their faith on industrialization and many of them

---

[10] The new agreement calls for 16 million tons of wheat and about 1 million tons of rice over a four year period, or 4.25 million tons per year. Normal food grain production in India seems to be about 70 million tons. The P.L. 480 foods therefore will add 6 percent to normal internal production. (These are all metric tons.)

look upon agriculture as a burden in winning economic growth. According to this view, consumer prices in urban and industrial areas must be held down so that a pressure for higher wages will not choke industrialization.[11] If in the process farm prices decline relatively, this is looked upon as of no economic consequence because of the widely held belief that the price response of cultivators is zero. Lower farm prices by this view will not induce cultivators to reduce production; if anything, it may even cause cultivators to produce more.

I take a dim view of this climate of opinion. Not a few countries presently receiving substantial amounts of P.L. 480 farm products are in danger of impairing their agriculture. If this were to happen, it would indeed be serious for them and I would have thought also for us in the long run. It is a danger that can be averted. But the prospects of doing so are not bright in view of the pressure by Congress for disposal programs, come what may, and given the economic misconceptions that predominate in so many of the countries now receiving P.L. 480 farm products.

I do not want to leave the impression that no one has been aware of this aspect of P.L. 480. No less an authority than W. W. Wilcox, in reporting on discussions in Santiago, noted that "Staff members of FAO attending the Conference expressed the view that there probably was more danger of serious adverse effects on the producers in the receiving countries from continued P.L. 480 exports than on competitive producers in other exporting countries. They are apprehensive that desirable, and in the long run, necessary agriculture development in the receiving countries will not take place if P.L. 480 exports are continued and expanded."[12]

This is *not* the occasion to outline a program for averting these adverse affects of P.L. 480 imports nor can it be done in a few paragraphs. Even so, one plausible line of attack must at least be mentioned. One of the difficulties that confront cultivators in India is the many serious price fluctuations that occur. If a program were devised that would reduce substantially this kind of price uncertainty in agriculture, it seems likely that the effect would be to induce an expansion in agricultural production,[13] even if average prices over 3 or 5 year periods were somewhat lower than they otherwise would be.

---

[11] This lack of concern about the effects of P.L. 480 imports upon agriculture is also evident in FAO's otherwise excellent study, *National Food Reserve Policies in Underdeveloped Countries*, Commodity Studies No. 11, 1958.

[12] From a letter dated March 18, 1959, quoted here with the permission of Walter W. Wilcox, Senior Specialist in Agriculture of the Library of Congress.

[13] I wish that those who prepared the FAO study cited in footnote 11, above, had addressed themselves to this potentially large contribution of larger food reserves.

The burden of this paper has been threefold. First, it shows that half or more of the CCC costs that are being covered by U.S. appropriations are a result of our internal farm programs. Nor would the countries receiving P.L. 480 products take the present volume even at one-half of CCC costs if they could receive from us the equivalent in dollars instead of grants in kind. Second, once the United States has faced up to the fact that foreign currencies deposited with a U.S. Embassy are not dollars and the excessive balance of these U.S. owned foreign currencies have been reduced, say not to exceed U.S. needs for the next two or three years for a foreign currency, we will find that the real payments to us will run between 10 and 15 cents per dollar of CCC costs. Thus eventually, by far the larger part of these P.L. 480 farm products will represent a grant from the United States. It is important, however, that we bring our policy and programs in line with this economic fact. The third part of this paper, which is admittedly speculative, calls attention to the potentially serious longer-run adverse effects of P.L. 480 farm products upon the agriculture of those countries now absorbing substantial amounts of them, *unless positive measures are taken* to counteract these adverse effects.

IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON UNDERDEVELOPED ECONOMIES– THE INDIAN PERSPECTIVE

S. R. SEN
Planning Commission, New Delhi, India

IT IS A great privilege indeed to have the opportunity to say a few words before this Conference on a subject which is of great interest not only to our two countries but also to the world at large.

Prof. Schultz has analysed for you the American perspective–the perspective of the donor country. My task is simpler, namely, to place before you a personal appreciation of the Indian perspective–the problems and prospects that face a recipient country.

As in the donor country, so also in recipient countries the implications of surplus disposal were not quite clear in the earlier days.

When the surplus disposal programme was first mooted, the picture that was given by some American spokesmen in their public statements often varied from that given by the American official representatives at the conference table. The former tended to create the impression that since the surplus was a burden for the U.S.A., it could be taken away as a free gift by needy countries and used for giving relief to the poorer sections of their population. The latter often worked on the assumption that although these commodities were surplus in the U.S.A. they were a scarce resource for the rest of the world, and that the underdeveloped countries would vie with one another for getting these surpluses. Therefore they considered it to be their duty to impose a number of conditions so that no one took away more than the minimum required or misused in any way whatever was given. They also possibly felt that these surpluses could prove useful for inducing the recipient countries to follow a certain line in their social and economic policies. Thus the face that the U.S.A. presented to the underdeveloped countries was a combination of that of a kind-hearted humanitarian, an anxious salesman and a hard-headed negotiator.

The reaction in the underdeveloped countries was mixed. The response of the general public to the "give away" slogan took two different forms. Some felt that it was a most generous offer and were impatient that their governments were not moving fast enough to procure as much of these surpluses as possible for improving the lot of the poorer sections of their people through projects for improving nutritional standards or even through straightforward doles. Others thought that surplus disposal was really a form of charity, the acceptance of which would adversely affect their national morale and weaken the spirit of self-reliance.

The reaction of some of the governments, on the other hand, often was that the surplus disposal programme was in reality nothing more than a sophisticated method of dumping and quite a few began to worry seriously about its possible effects on their own agricultural production and their export trade with other countries and about possible distortions in their programmes for economic development.

This feeling was strengthened by the fact that most of the offers of commodity assistance that were made in those days other than as budgetary support for mutual security purposes were usually on a project basis and many of these projects were of a relief or welfare rather than productive character, as these were supposed to have a greater appeal for the general public in the donor and recipient countries alike.

Commodity assistance given for emergency relief never created any difficulty and was always welcome. But the quantities involved were relatively small and did not make any substantial dent on the vast surpluses that were being accumulated year after year. Increasing emphasis was, therefore, put on welfare projects which could be taken up on a large scale.

There was, however, a reluctance on the part of responsible officials in a number of underdeveloped countries to start such a project, say a scheme for improving the nutritional standard of poor families on the basis of American gift milk powder, which they felt did not immediately add to the national income and could not be continued once the foreign aid stopped. They considered it inadvisable to create a demand for milk powder on the basis of a gift received from abroad and then to have to stop supplies suddenly after a couple of years or so because the surplus disappeared and the gift ceased to be available and meanwhile enough milk production had not been developed in the country either.

Moreover in those days, the surplus disposal deals were strictly on a year to year basis. Any worthwhile project required three to five years to develop, but once it was started on the basis of a commodity assistance promised only for a year, the uncertainty about its being continued in subsequent years caused a perpetual worry to the authorities in recipient countries and sometimes led to a distortion in their own plans for development. Besides, in most of the projects only a part of the cost could be met by the surplus commodities. If the balance had to be provided from the scarce resources of the recipient country itself, it tended to upset its other important programmes. The American officials, therefore, often discovered in course of negotiations with underdeveloped countries that there was not that degree of enthusiasm for accepting the surplus commodities that they had originally expected to exist.

Much of the hesitation of the underdeveloped countries disappeared, however, when the programme for surplus disposal was integrated with

their own programmes for economic development. If surplus commodities could be used for accelerating economic development, it created conditions which enabled the recipient country to do without such commodity assistance after some time. Once a comprehensive programme for economic development was adopted, a number of welfare projects could be also taken up simultaneously with foreign assistance, as these could be then continued with the country's increasing income even after foreign assistance terminated. Moreover, if the programme for economic development was formulated taking into consideration the nation's resources as also its diverse needs it was likely to be a balanced one, and if the surplus disposal programme was integrated with it the risk of any imbalance caused by it or of doing something which the nation could not really afford in the long run would not become serious.

That is why from the very beginning Indian authorities laid stress on three points. Firstly, the P.L. 480 assistance should be on a programme basis and not on a project basis and should be integrated with her own plan for national development. Secondly, she should not start any programme on the basis of P.L. 480 assistance which could not be later carried out with her own resources with some tightening of the belt, if necessary. Thirdly, there should be at least an informal, if not a formal, understanding that the programme should continue for a certain minimum period and should not be stopped half way or without notice.

The American authorities appreciated these points made by India and accepted more or less all of them. In consequence, the results of the surplus disposal programme have been very encouraging so far as India is concerned.

Although there were some small supplies of surplus commodities earlier, commodity assistance to India started really in a big way in 1956 under P.L. 480, soon after India's Second Five Year Plan began. Altogether, four agreements under P.L. 480, Title I programme were signed between 1956 and 1959. While the CCC cost including ocean transportation amounted to $1365 million, the market value including transportation totalled $927 million, of which $659 million was the market value of wheat, $18 million of coarse grains, $43 million of rice, $56 million of cotton, $6.5 million of tobacco and $3.5 million of dairy products. The total quantity of wheat amounted to about 10 million tons and of rice about 0.4 million tons and all these supplies were consumed in India during the Second Plan period itself. Out of $927 million expected to be generated from these commodities, about $149 million is being retained for U.S. uses, $92 million is to be given as loan to U.S. private enterprise under the Cooley Amendment and the balance of $686 million is available to India for economic development in the proportion of $194 million as grant and $492 million as loan. The grant portion partly covers the

difference between the price and transportation cost of supplies from the U.S.A. and other exporting countries.

A new Agreement has been recently negotiated for a period of four years beginning with 1960-61, which provides for the supply of 16 million tons of wheat and 1 million tons of rice, costing $1276 million inclusive of ocean transportation, the bulk of which will be available for use primarily in the Third Five Year Plan period. The fact that this Agreement is for a relatively longer period, namely 4 years, and has been negotiated at the stage when India is formulating her Third Plan is likely to prove particularly helpful because it will enable a proper integration with the country's overall Plan and thus optimise the benefits likely to result from this assistance. This deal, which is the largest of its kind in history, is an eloquent proof, if any proof was needed, that from the standpoint of both the participant countries the result of the surplus disposal programmes which preceded it has been encouraging.

P.L. 480 supplies have helped considerably to mitigate the shortages in the economy and give protection to a large vulnerable section of the population. For instance, prices of wheat, which comprise the bulk of P.L. 480 supplies, have been prevented from sky-rocketing, even in years of severe shortage. At the same time, there has not been any occasion since P.L. 480 supplies started in 1956 for prices to fall to such a low level as to discourage domestic production. The risk that large P.L. 480 supplies of wheat might adversely affect the country's food production was counteracted by the fact that India had a plan for economic development which tended to create additional demand for food. Moreover, purchases made by government in the domestic market at fixed prices for maintaining fair-price shops provided some support to farm prices. India's production of wheat went up from 8.5 million tons to 9.7 million tons during the same period. The fact that these surpluses were available has not been allowed to slacken the efforts for agricultural development. The provision for agricultural development (including community development and irrigation) was actually increased from $1.6 billion under the First Plan (1951-56) to $2.1 billion under the Second Plan (1956-61) and is proposed to be further increased to over $3.5 billion in the Third Plan (1961-66).[1] The index number of agricultural production (base 1949-50) has gone up from 117 in 1955-56 to 131 in 1958-59 and the target for 1960-61 has been put at 135 and for 1965-66 at 175. The counterpart

[1] The break up is as follows:

	First Plan	Second Plan	Third Plan (provisional)
	(Million dollars)		
Agriculture & minor irrigation	487	672	1313
Community development & cooperation	256	441	840
Major and medium irrigation	815	945	1365

funds have been fed into the overall Plan for economic development of the country and have contributed 7 percent of the Second Plan outlay.

India's purchases from other countries under commercial marketing terms also have not been lower than normal in spite of such large imports under P.L. 480 and substantial increase in production. In fact, India's average annual import of wheat outside P.L. 480 during the period 1956-59 has been 0.44 million tons as against 0.28 million tons in 1955-56. The relative share of wheat in the total amount of cereals consumed in the country has risen from 15 to 20 per cent without any decline in the consumption of other cereals.

As far as I have been able to gather, the experience of a number of other underdeveloped countries has also been similar. In fact, a study of the effects of P.L. 480 operations in 26 countries where wheat has been supplied under Title I shows that during the four year period 1955-56 through 1958-59 the average consumption of wheat has gone up by about 7.4 lbs. per person as against the corresponding period 1951-52 through 1954-55, and that out of this only 3.4 lbs. could be ascribed to normal increase and the balance of 4 lbs. was due to P.L. 480 supplies. Production in most of the recipient countries has gone up. On the other hand, P.L. 480 sales did not have any appreciable effect upon the source pattern changes in the international trade in wheat which occurred over this period. The total volume of commercial sales also was not adversely affected. One interesting fact, however, is that while the commercial export of the U.S.A. has declined to some extent (although more than compensated by increase in special programme sales), that of other countries has, in fact, increased.[2] It would appear, therefore, that under the umbrella provided by P.L. 480, the production and trade of other countries have generally thrived and the F.A.O. principles of surplus disposal which lay stress on expanding consumption and safeguarding normal trade patterns have been broadly adhered to, although there may have been occasional lapses here and there.

---

[2] Data on exports of wheat are as follows:

Destination and source	1952-55 average (Million tons)	1956-59 average (Million tons)
	On commercial terms	
P.L. 480 Title I Countries		
United States	2.1	1.5
Other exporting countries	6.1	6.6
Total	8.2	8.1
World Total		
United States	6.1	5.7
Other exporting countries	18.4	20.8
Total	24.5	26.5
	Under special concessional programmes from U.S.A.	
P.L. 480 Title I Countries	2.6	6.0

While P.L. 480 supplies have generally helped to improve the consumption standard as also the economic position of all recipient countries, the benefits seem to have been derived relatively more by those countries which utilised this assistance primarily for economic development rather than for other purposes. On the other hand, countries which became too much "addicted" to commodity assistance and used counterpart funds mainly for non-developmental purposes became more and more dependent on such assistance. There can be little doubt that it will be now better for them to have a programme of gradually phasing out of dependence upon P.L. 480 assistance for non-developmental purposes and concentrate such assistance on developmental purposes as far as practicable. No one could surely take exception to commodity assistance for meeting emergencies like famine, but in all other cases it is desirable that commodity assistance should be utilised primarily for economic development. Welfare projects, however desirable, should not be of such a proportion that they cannot be ultimately financed from the income generated by the economic development projects included in the overall national programme for development.

These are substantial points on the credit side of the surplus disposal policy adopted by the U.S.A. There is no doubt that if U.S. surpluses were thrown on the international market and prices allowed to crash most other exporting countries would have suffered serious loss. On the other hand, if P.L. 480 supplies were not available, the programmes for economic development in a number of underdeveloped countries would have been more modest or their people would have had to face much more stringent control over consumption than they have to do at present. There is general appreciation in these countries that the P.L. 480 supplies have been of great help to their economic and social development. The use that has been made of the counterpart funds in building up the infrastructure of the economy, in constructing irrigation and power facilities, improving transport and communications and promoting research and extension is certainly noteworthy. But no less important is the indirect influence of these development projects in creating an urge among the people, preparing them for change, and thus creating favourable material and psychological conditions for further progress.

There are, however, a few developments which are causing some concern lately. In the first place, there seems to be a growing risk that because these underdeveloped countries are getting commodity assistance of a certain order, there may be some pressure to treat commodity assistance as a substitute for the direct foreign exchange assistance that most of these countries require. If this happens, the consequences will be most unfortunate. This risk is increased by the manner in which the value of the commodity assistance appears in dollar terms in American

accounts so that it looks much larger than what it is in fact in real terms. According to Prof. Schultz's calculations, if CCC costs of P.L. 480 products were 100, sales for foreign currencies become 70, value at world market prices equals 50 and value to recipient countries works out to 37.

At first sight it may seem that the present accounting procedure which exhibits a higher dollar figure for the aid is not of much consequence. But it may have an unfortunate effect if in any way it creates a feeling of complacency in the donor country which may have the effect of slowing down the direct foreign exchange assistance which the underdeveloped countries badly require.

I cannot emphasise too strongly the point that while commodity assistance is helpful, much of its value is lost if it is not backed by adequate supply of foreign exchange, especially under the conditions which obtain today in most of the underdeveloped countries. If the commodity assistance that the underdeveloped countries are receiving is not supplemented by enough foreign exchange aid and if their economic development is retarded thereby, the commodity supplies which they have contracted for may prove to be a drag on their economy. On the other hand, if enough foreign exchange assistance is available, their economic development will be accelerated and they will be able not only to absorb the supplies which they have contracted for but even to import more in future and also advance the date when they will be able to pay for their imports in dollars. It is worth noting in this context that the increase in per capita consumption that has resulted from P.L. 480 supplies has taken place primarily in the underdeveloped countries. In the developed countries, the increase in per capita consumption of wheat has been very small. Therefore, if the objective is to expand the market substantially in the long run, an effective way of doing so would be to give for a few years adequate foreign exchange assistance to the underdeveloped countries so that, supplemented by commodity assistance, it can promote their economic development and expand their purchasing power.

It should be appreciated that, other things remaining the same, any large scale import of agricultural products over and above normal imports is likely to impair agricultural development in a recipient country. It is only if the latter has a balanced programme for industrial and agricultural development which is designed to create additional employment and purchasing power that the effect of surplus disposal will become truly beneficial.

My second point relates to the counterpart funds which are rapidly accumulating in all the recipient countries. So long as the use of these counterpart funds is fitted into the overall programmes for economic development of these countries in a general way, there may not be much difficulty. But if the impression gets round that these funds may be avail-

able for projects outside such overall programmes, serious difficulties are likely to follow. It will not be easy to convince the interested parties that these funds do not represent any additional real resources. Pressure will develop both in the recipient and donor countries for spending these counterpart funds on various types of new projects, and to the extent that these pressures may prove successful there will be a diversion of material resources from the projects included in the balanced programmes of economic development already prepared by the countries concerned. On the monetary side it would lead to inflation. On the material side it would lead to maldistribution of scarce resources. On the operational side it would lead to serious political and economic difficulties to the extent that the decisions about spending the counterpart funds at the first stage, when they are lent to the recipient governments, and especially at the second stage, after they have been repaid by these governments, differ from the investment programmes and policies of the authorities of these countries themselves. The latter, in particular, is likely to become a serious source of friction in future unless some satisfactory solution is found right now. It may also be a fertile field for bureaucratic interference and conflicts. What has been mentioned above about difficulties arising out of the diversion of resources applies with equal force to funds retained for U.S. uses, including those to be disbursed under the Cooley Amendment, especially if these happen to be large. In addition, the disbursement of Cooley funds may in certain recipient countries involve the donor country, unless it is very careful, in local political controversies which may undo much of the goodwill that the commodity assistance is otherwise expected to create. It is, therefore, important that an early solution should be found for this problem of growing accumulation of inconvertible local currencies.

My third point follows from the second. The growing anxiety in donor countries to show that specific projects have been financed from the commodity sales funds is understandable. But economically as also operationally the project approach is always much less satisfactory than the programme approach. If a country has a comprehensive programme for economic development, it is in my judgment a retrograde step to insist on a project approach. On the other hand, if a country does not have such a programme and the project approach is found to be indispensable, the overall economic situation and policies should be carefully examined before a project involving a large-scale investment is considered for commodity assistance.

What I have said above should not, however, be construed to mean that the project approach has necessarily to be ruled out in all cases. Relatively small projects may often be started without undue concern about the effect on the economy as a whole. There are also certain types

of projects about which it can be safely said that even if started on a large scale they should produce wholesome effects on the economy. For instance, surplus food grains can be very profitably used in works projects which aim at utilising the idle manpower in an underdeveloped country for constructing irrigation works, contour bunds, market roads, etc., or for building up buffer stocks to stabilise the price level, or in educational projects designed to improve the productive efficiency of the people. But even in such obviously unexceptionable cases, it would be desirable to incorporate these specific projects into an overall programme of economic development at the earliest possible opportunity.

It is true that if the projects are merely picked out of the country's national plan, where such a plan exists, not much harm may be done. But even in such cases, the insistence on a project approach may give a slant to the aid programme which may not be conducive to economic progress if there is a tendency to select projects which are more spectacular and less productive in preference to others which may be more productive but are less spectacular. Whether an underdeveloped country has an economic plan or not, it is essential that there should be a proper balance between projects of economic development and social welfare in its development programme so that when foreign assistance ceases, the welfare projects can be continued with the income generated by the economic development projects.

I would suggest that the American authorities concerned should give careful consideration to this point. The fact that they are assisting the general programme for economic development of the underdeveloped countries will be always gratefully acknowledged. There is no further point in pressing for the project approach, especially in those countries which have a comprehensive plan for economic development. The only result that will follow will be either distortion of the balanced programme which the country has adopted or irritation amongst interested parties in the donor as also recipient countries that the projects sponsored by them could not be accommodated because they did not fit in with the general programme or policy for economic development.

Another point which I may briefly note here is the question of normal marketing. There can be no difference of opinion that the surplus disposal programme should be such as not to affect adversely the normal trade in the commodity concerned. It would not, however, be advisable to interpret this condition too narrowly or too rigidly. It is the total sales in the international market as a whole and over a period of years that has really to be safeguarded and not sales to a particular country in a particular year. It is also important to make a distinction between sales to a developed country (or even to an underdeveloped country which has no serious balance of payments problem) and to an underdeveloped country

which is facing serious and persistent shortage of foreign exchange as a result of special efforts to accelerate the development of its economy into the self-sustaining stage. In the latter case, it would be desirable to relax the condition of normal marketing so long as the recipient country is adjudged to require foreign exchange assistance. Otherwise one would get into the anomalous position that the payment for the normal marketing quota which may be apparently made by the importing country is in effect made indirectly by other countries which have in their generosity agreed to give foreign exchange assistance for its economic development. To the extent that it means a reduction in effective aid, there may be a postponement of the date by which the recipient country is expected to become self sustaining. The other surplus countries, which are economically more advanced, should consider whether they should not treat such temporary reduction in their normal marketing to a particular underdeveloped country as a part of their share of economic aid for the development of that country and alternatively make up by direct foreign exchange grants whatever the recipient country has to pay for maintaining its quota of normal imports through commercial channels. By doing so, they are not likely to lose very much, for the normal imports of such underdeveloped countries have been in the past only a small fraction of the total international trade in most of the surplus commodities. Moreover, once these countries become self sustaining as a result of economic development, the volume of their imports is bound to increase very substantially. It is, however, desirable that a recipient country should maintain its total normal imports from other underdeveloped countries and those developed countries whose economy is likely to be seriously affected if there is even a temporary decline in their exports to it.

The time has now come when on these and other related points the donor and the recipient countries should take a long-term rather than a short-term view. For, present indications are that the problem of surplus disposal is going to remain with us for several years to come. The surplus that is emerging in the United States is no doubt partly due to the price policy followed by her but it is also partly due to the tremendous technological progress which is taking place in this country at an accelerated pace. In this situation, it is doubtful whether the measures for controlling supplies or even re-orienting the price policy can achieve more than partial success, especially in the short period, in view of the political and administrative difficulties involved. In any case, during the time that is likely to be taken for these policies to be fully effective, it will be helpful if new markets can be found for the surplus products so that at least direct restriction of production, which has several undesirable features, can be avoided. And as I have mentioned earlier, that can be best done by promoting the economic development of countries which are under-

developed and are, therefore, also underfed. Since many of these countries are in the tropics, their agriculture is complementary to the agriculture of a country like the U.S.A. which is in the temperate zone. If the agriculture of the former can be developed and trade with the latter stimulated, some outlet could be found for the surplus of the latter. It is, however, mainly through the industrialisation of these underdeveloped countries that a really large-scale expansion of markets can become possible. After all, even today the best customers of America's industries are other industrialised countries and not countries which have yet to industrialise. To the extent that surplus commodities can be used for the development of the agriculture as also industry of the underdeveloped countries, it would help not only the recipients but also the donors.

But here I would like to stress once again that commodity assistance is necessary but by itself it is not adequate. Surplus commodities cannot be used effectively unless they are matched adequately by free foreign exchange resources.

Professor Cochrane in his admirable presidential address last year talked of a marriage between foreign surplus disposal and internal supply control in the U.S.A. I doubt in view of the ever-growing stream of technological progress which the U.S.A. is experiencing today whether supply control by itself will prove anything more than a temporary palliative. I would commend to Professor Cochrane and to you a supplementary proposal which, if implemented with imagination, efficiency and flexibility, may also offer a long-term solution, namely, an appropriately phased programme over an agreed period during which coordinated steps will be taken in the U.S.A. to reduce the volume of surplus and in the underdeveloped countries to increase their purchasing power through economic development.

The key note of this programme should be "phasing out"—for the U.S.A. out of the burdensome surplus and for the underdeveloped countries out of the vicious circle of shortage. But such a programme can be practicable only if both the parties are prepared to sacrifice to some extent their present consumption for future investment. For the underdeveloped countries it would mean a special effort for saving a larger proportion of their meagre income for investment in a programme for economic development. For the U.S.A. it would mean a diversion of a small share of its ever-growing prosperity in the form of direct foreign exchange assistance to the underdeveloped countries—an assistance which is essential for making the optimum use of the commodity surplus that is threatening to become such a burden on its economy.

No doubt the U.S.A. is today disbursing over $3 billion a year in foreign aid. But three fourths of that is for defence and political relief and only one-fourth is for economic development. If the coordinated pro-

gramme that I have suggested above is to be made a success, both the quantum and proportion of the dollar assistance for economic development have to be much higher than they are at present. Nevertheless, it will still remain a small fraction of the national income or even of the public revenues of the U.S.A.

Once such a programme has been worked out between the U.S.A. and an underdeveloped country, the commodity assistance promised for the period by the former should be definitely obligated out of CCC stocks and cease to be counted as surplus. This should be also accompanied by at least an informal, if not formal, understanding regarding foreign exchange assistance. The underdeveloped country in its turn should agree to adopt a plan for economic development which would enable it to become self sustaining within a reasonable period.

In the last analysis, both the parties should recognise that a soundly planned and effective disposal programme is a necessity equally for the recipient and the donor. To the former, it is necessary because otherwise economic progress will be slow. To the latter also it is necessary because otherwise it will be faced with serious storage and price problems which may jeopardise the very stability of its economy. It is the recognition of such mutual self-interest and the preparedness to help the other side in solving their problem as much as in solving one's own, that one can really hope for success in great ventures of this kind.

DISCUSSION: IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON UNDERDEVELOPED ECONOMIES

R. O. Olson
Ohio State University

Few government programs have had so much intuitive appeal as P.L. 480. Here we have an apparent means for satisfying humanitarian motives of feeding hungry people and contributing to their economic development while, at the same time, disposing of embarrassing surpluses; Professor Schultz tries hard to destroy this image. His view that alternative policies would be better for dealing with our domestic problems will not be disputed. But this is somewhat beside the point of the value of the surpluses to underdeveloped countries.

In assessing the effect of the surpluses on the receiving countries, Professor Schultz examines three questions: (1) What is the value of P.L. 480 products to countries receiving them relative to U.S. costs? (2) What do these countries "pay" us for P.L. 480 products? (3) What are the effects of P.L. 480 products on agriculture of the countries that receive them? Discussion of these three related questions makes up the three major sections of his paper.

He estimates that the value of agricultural products to the recipient countries is about 37 cents for each dollar of CCC costs. This is based on his guess that the value to the recipient countries is only three-fourths what the world price would have been if these commodities had been sold on the world market. It is hard to say how good a guess this is but my own impression is that, despite the great demand for industrial goods, food imports would have had a very high priority in India in the last few years.

Regarding costs, it makes sense to think in terms of "marginal revenue foregone." We might measure this, as he does, in terms of the additional revenue we would have received if we had sold this surplus in world markets for what it would bring. But, why do that? It seems that the alternative to disposal under P.L. 480 has not really been outright dumping, as he suggests, but further accumulation in storage. In any case, of course, the marginal revenue foregone may be zero (or less).

Schultz's reasoning on what the receiving countries actually pay for P.L. 480 goods is interesting and illuminating. I couldn't quarrel with his estimates that payments will amount to only 10-15 percent of CCC costs. I'm sure few people realize it is this low.

It is on the third question that I find myself in considerable disagreement with Professor Schultz. In a country such as India, where there are idle resources, particularly labor resources, there are opportunities for converting these resources to capital, sometimes quite directly; but employment of these resources requires, normally, that they be paid for. This gives rise to increased demand for food. Since it is likely that the income elasticity for food is quite high in such situations, the increase in demand for food will be of considerable consequence. P.L. 480 imports are intended to offset this increase in demand—making possible, then, additional development investment by deficit financing without inflation of food prices. In the last few years, my obesrvation is that the high levels of food prices were of very considerable concern to the Indian Government and the available food supplies limited the pace at which development could move. Absence of P.L. 480 products would have resulted in further cuts in the second 5-year plan. In other words, I suspect that in the absence of P.L. 480 goods, agricultural prices in India would have been no higher than they were with them. But development would have been slowed down.

I am not sure it is a misconception to believe that the price response of Indian cultivators is very low; on the contrary, there is convincing evidence that there is a negative supply response by way of income effect. For the vast majority of farmers, the marketable surplus is very small. The response to a price rise may well be to retain more for consumption. If agricultural prices were to decline, to what would resources now used in agriculture be diverted? Not much agricultural land or labor has an alter-

native opportunity. How about other resources? It would be profitable for most farmers to increase their use of irrigation water, improved seeds, fertilizers and insecticides even with much lower farm prices. The failure to increase yields is not due to lack of price incentive but to lack of knowledge, nonavailability of fertilizers, lack of credit, etc. Advances on this front depend less upon price incentives than upon government action in providing more irrigation and drainage facilities, an aggressive extension program, an efficient agricultural supply system and an effective credit system. To me, there seems no reason to believe the P.L. 480 imports should slacken governments' efforts along these lines unless they viewed our surplus program as a permanent phenomenon. I know of no country that could be accused of such shortsightedness. On the other hand, the imports are likely to be used to finance development investment, such as roads, irrigation canals, etc., which should reduce costs of agricultural production.

Professor Schultz suggests that the adverse effects he alleges the surplus commodities have on the receiving countries' agriculture may be averted by devising the program to reduce substantially the price uncertainty in agriculture. I heartily agree that this is desirable and I believe this has been an important effect of the program. It is my understanding that this is a prominent feature of the most recent agreement with India which he referred to.

Dr. Sen's excellent paper helps to restore confidence that P.L. 480 is accomplishing some good abroad. In addition, it gives us a very clear idea of the problems recipient governments face in negotiating and carrying out agreements under P.L. 480. Dr. Sen is very understanding of our natural desire to see the proceeds of P.L. 480 sales earmarked for specific projects. At the same time, he makes clear why it is not wise to accommodate us.

Here I would like to say something about the large bank accounts we are accumulating in some countries as a result of the surplus sales. Professor Schultz expressed concern over our holding such excessive balances of these currencies and suggested that we turn these back to the recipient countries. I endorse this suggestion, not so much because there is danger we will use them unwisely, but because I think there is no point in retaining them. The reason our foreign currencies are accumulating is that we cannot easily reach agreement with recipient countries on specific projects for which we will extend loans or grants. Suppose we insist that we will not release these funds except for project X; the consequence is that the currencies continue on deposit where they serve as the basis for bank investments in government securities. Money is created and spent by the recipient governments for purposes within their plans.

As I see it, the contribution of the P.L. 480 aid to the recipient country

occurs not at the time we spend our balances but at the time the surplus commodities move into that country's market stream, and the benefit depends on the extent to which the recipient country takes advantage of the presence of these goods to step up the pace of development. It can do this with created money, with loans backed by our deposits in its banks. If we measure the contribution of the P.L. 480 program by the way we have spent our receipts from their sale, we greatly underestimate the contribution. The truth of the matter is that, even if none of this is ever spent by us, the recipient country may safely have spent the equivalent of it without inflationary dangers. Inflationary pressures will come if and when we set about to use these balances. They do not, at that time, constitute additional resources. Recipient countries that have integrated development plans cannot look upon loans or grants from us from these funds as of any benefit to them unless they are used for items already in their plan. They may humor us by indicating the funds are to be applied against specific projects in the plan, but this can have no real meaning. If we insist that our funds be used for specific projects outside the plans, the recipient country has two choices: it may agree to spend it as we propose, and cut expenditures under its planned outlays accordingly; or, it may fail to agree on a use for our funds and let them accumulate in our account. It will probably prefer the latter; then it may borrow against our deposits and go on with its plans.

What does it matter if we stand firm, insisting the proceeds be spent on projects we favor? It matters only in this way, as Dr. Sen so clearly points out: this becomes a source of needless friction and irritation between the negotiating parties. Certainly we should appreciate that recipient countries must and will insure that the use of these funds, either as grants or as loans, fit into their own plans for economic development.

Both Dr. Sen and Professor Schultz have pointed to the danger that P.L. 480 assistance will be looked upon in our country as a substitute for other forms of economic aid. This seems to be the real danger. In most underdeveloped countries, there are limited opportunities for efficiently transforming underemployed indigenous resources into capital goods without combining them with other resources requiring foreign exchange. Thus, the effectiveness of P.L. 480 assistance in promoting economic development depends, as Dr. Sen explains, very largely on complementary dollar aid.

As both authors urge, our focus needs to be on aiding economic development in the underdeveloped countries on a basis similar to the Marshall Plan. In the long run, this may do much to increase the demand for our commodities which are in surplus. I suspect that, even in the short run, if aid were extended as under the Marshall Plan very substantial proportions might be used to buy our surplus agricultural commodities.

DISCUSSION: IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON UNDERDEVELOPED ECONOMIES*

LAWRENCE WITT
Michigan State University

The two papers differ widely in their views of the value of farm surpluses. Dr. Schultz would substitute dollar aid for the program, just as welfare and Social Security programs displaced the Stamp Plan. Dr. Sen would accept such an approach but sees much that can be done under present legislative and administrative procedures. Modifications already made by the F.A.S., and others proposed by him, make more feasible the long term planning needed for real economic development. He does argue strongly for additional dollar aid. Dr. Schultz argues that we magnify the load of a speeding express train of surplus disposal, while the passenger train of economic development winds through sidetracks. Dr. Sen says that the general direction of the sidetrack is not too bad, and that with a couple of switches we can send both trains to the right destination. There is much in each of these papers with which I agree. They pose important issues, and I will refer briefly to these points to give them greater emphasis. At other places I part company with our distinguished speakers, and will provide somewhat more detailed comment.

It will be convenient to begin with some differences between the two papers. One of these is in reference to agricultural prices and productivity in India. Since Dr. Olson discussed this issue in some detail, let me pass over this quickly. Dr. Schultz appears to be overstating the importance of prices—counter to the argument of his 1956 paper,[1] where in viewing highly commercialized American agriculture, he put major emphasis on changes in input characteristics and shifts in the supply curve. Of crucial importance are the *facts* as to how an underdeveloped country expands its agriculture.

Another difference between the two speakers is more subtle. By arguing that the value of farm products sent by the U.S. to India is greatly overstated, the first paper gives the impression that they are of limited value. Dr. Sen argues that they can be of substantial value for economic growth, if committed over a long enough period to be incorporated into development programs, if used for development rather than welfare, and if they

* In preparing this comment I have benefited from discussions with Dale Hathaway, Martin Pond, James Goering, Darrel Plaunt and James Liebfried, and from material collected by John Vondruska. I also have drawn on material developed under a subproject of IRM-1 "National Policies for Agricultural Prices and Incomes."

[1] "Reflections on Agricultural Production, Output and Supply," *J. Farm Econ.*, Aug. 1956.

do not bring over-dependence on outside supplies. One cannot help but feel that this is over-optimism. Both speakers put a welcome emphasis on the necessity of supplemental dollar aid for a vital, dynamic development program.

Dr. Schultz raises a series of political and value questions which leave me perplexed and concerned. Implicitly he favors a larger dollar appropriation for development purposes. With qualifications, I agree. He seems to argue that if the real cost allocations were known—and his paper attempts to define them—the smallness of the development appropriation would be apparent, and dollar appropriations would increase. Congressional action surely does not provide clear evidence on this score. Unless one argues that local military units are a strong force for development, a good case can be made that there is a larger proportion of development assistance in P.L. 480 than in the Foreign Aid Program. Given the segmented structure of American government and the several Congressional Committees, there is at least some argument as to the procedure for "maximizing" development assistance. I doubt that the elimination of P.L. 480 would lead to its replacement by some $500 million of new appropriations for economic assistance in the Foreign Aid Budget.

Dr. Schultz complains that foreign economic policy is formulated to fit our internal convenience. This perhaps is another way of saying that agriculture's interest in development is a façade, and a stop gap until other solutions come into view. But every major nation and most others pursue a foreign policy in which the basic elements are internally defined, and presumed to be in its self-interest. Perhaps Dr. Schultz should be arguing that we mis-read our self-interest. If the repeated experiences in Congress are any indication, the task is complicated. We need a shift in our values, a reordering of time preferences and a recognition that our interests in a prosperous South Asia (and other less developed areas) require not military aid, but unilateral transfers of purchasing power to support substantial development programs, whether it be for food, machine tools, or means of creating human capital. In a society with such objectives, compromises and convenience marriages would not be needed.

What Is the Equilibrium Price?

Dr. Schultz estimates that exportable farm surpluses could be sold for dollars at 50 percent of CCC costs. Since some may take this as a policy proposal, it is appropriate to review his conclusions. I have had difficulty in clarifying his meaning. In analyzing his hypothetical situation, does one assume the continuance of donations under Section 416 of the AAA, local currency sales under Section 402 of the Mutual Security Act, credit sales by the Export-Import Bank and the CCC, payments to exporters under the International Wheat Agreement, and other price reductions by

TABLE 1. U.S. EXPORTS OF FOUR AGRICULTURAL COMMODITIES UNDER VARIOUS PROGRAMS, FISCAL 1958–59, QUANTITIES AND PERCENTAGES

Program and Commodity	Unit	Public Law 480				P.L. 665 Sec. 402 Economic Aid[1]	Subtotal	Commercial Exports		Total Agricultrual Exports[1]
		Title I Foreign Currency[1]	Title II Famine and Relief[1]	Title III Foreign Donations[1]	Title III Barter[1]			Exports With Price Reduction[2]	Un-assisted Exports[2]	
		Thousands of Units and Percentages								
Cotton (running bale)	bales	640	8	—	376	812	1,836	1,293	—	3,129
	percent	20.5	0.2	—	12.0	26.0	58.7	41.3	—	100.0
Wheat grain (60 lb.)	bushel	221,508	9,329	679	20,620	20,793	272,929	87,428	879	361,236
grain equiv. of flour[3]	bushel	9,807	1,470	19,844	2,323	3,622	37,067	43,295	207	80,569
total (60 lb.)	bushel	231,315	10,799	20,523	22,943[4]	24,415[4]	309,996	130,723[4]	1,086	441,805
	percent	52.4	2.4	4.7	5.2	5.5	70.2	29.6	0.2	100.0
Corn except seed (56 lb.)	bushel	23,273	1,661	771	14,527	201	40,379	144,633	18,141	203,153
	percent	11.4	0.8	0.4	7.2	0.1	19.9	71.2	8.9	100.0
Soybeans (60 lb.)	bushel	—	—	—	4,162	7,195	11,357	—	91,472	102,829
	percent	—	—	—	4.2	6.9	11.1	—	88.9	100.0
bean equiv. of oil[5]	bushel	64,428	—	—	—	1,601	66,029	—	6,204	72,233
	percent	89.2	—	—	—	2.2	91.4	—	8.6	100.0

[1] Foreign Agricultural Service, Circular FATP 16-60, U. S. Dept. of Agriculture.

[2] Latest figures provided by Robert Tontz, Foreign Agricultural Service, U. S. Dept. of Agriculture. Price reductions of 50 cents on wheat, $30.00 per bale on cotton and 11.5 cents per bushel for corn, for a total of $132.0 million. Hearings House Representatives, Dept. of Agriculture appropriation for 1961, Part 2, p. 282. Credit sales of $4.7 million for wheat, $49.4 million for cotton, and $19.3 million for corn represents further assistance.

[3] Converted at 100 pounds of flour to 2.3 bushels.

[4] During this period payments were made on 82,705,285 bushels of wheat and wheat equivalent of flour under the International Wheat Agreement. Exports under the P.L. 665 programs and under the Barter Program in some instances, as well as commercial sales, were eligible for registration under this program.

[5] In order to compare exports of oil with exports of beans, the oil is shown in terms of the bushels required to produce it, 1 pound of oil from 5.45 pounds of beans. The exports of soybean meal were very small.

the CCC, to say nothing of storage holdings? He uses 27 percent (the P.L. 480 sales) as the amount of local currency sales, to differentiate from commercial sales, though another 6 percent in 1958-59 was shipped under the very similar Section 402 program.

If the Foreign Agricultural Service were to present its estimates of exports under government programs to include dollar aid to exports,† the percentage of commercial exports would be far smaller. Our people would have a clearer indication of the problems in maintaining commercial exports. I have made such a tabulation (Table 1) for wheat, cotton, corn and soybeans, the first three being commodities in which major surpluses exist and the fourth a supposedly healthy commodity, not requiring extensive governmental assistance.

Over half of the wheat and cotton moves outside of dollar trade, and about a fifth of the corn and soybeans (in this case as oil). If government payments on commercial sales are included (which is really a charge against the support program, as Dr. Schultz points out), then virtually all the wheat and cotton, ninety percent of the corn, and a fourth of the soybeans are involved in government export programming. This export payment already has reduced dollar prices of wheat and cotton to 75 or 80 percent of the domestic market; even less if based on CCC costs. What kind of price reduction would be needed to add 242 million bushels of wheat now sold for "Foreign Currency" to the 900 million now sold by all countries in the world market? U.S. sales for dollars are only 90 million bushels. Note also that a currency grant was made to India in the recent P.L. 480 agreement bringing the actual local currency price down to 40 percent of CCC costs. And two-thirds of the remaining amount is designated for development loans in India!

Of course, Dr. Schultz is dealing with aggregates of farm products. Some changes in the commodity mix could be encouraged; still present P.L. 480 shipments are mostly wheat (50 percent), cotton (15 percent), fats and oils (15 percent), and to a lesser degree rice, feed grains and tobacco. Thus analysis should concentrate on the foreign markets for wheat, cotton and the soybean-feed grain complex. With these data in mind, with the continued expansion in agricultural productivity in western Europe and important competing export areas, and with counter measures likely in many countries, I am forced to conclude that the world market price for principal surpluses would be substantially less than 50 percent, at least until drastic shifts occurred in patterns of production and utilization.

Even if Dr. Schultz is right and modest price decreases and dollar grants would dispose of present P.L. 480 shipments, the effect on agricul-

† The *Trade Outlook Charts, 1961*, p. 8 and Table 4, p. 46, now do this for aggregate exports.

tural prices and welfare must be considered. Terms of trade certainly would be worsened for Canada, Australia, Argentina, and for a large group of underdeveloped countries which are dependent on cotton exports. Moreover, only by chance would the patterns of trade remain as at present. Dr. Schultz argues that underdeveloped countries receive more farm products than they would purchase on a free choice basis—with or without dollar grants for economic development. Presumably then, a competitive dollar bid market would shift food consumption from poor countries to wealthier countries in the short run and until real development occurred. Surely such a shift would retard development, unless dollar aid was very substantially expanded.

Defining Balance and Normal

In Dr. Sen's excellent paper the problem of defining "balance" looms large. Clearly, a balance between agricultural and industrial development is needed, and this will differ between India and Mexico, the United States and Italy, or Tennessee and Iowa. But where do we go for more specifics? Until we here and others abroad give much greater attention to the contribution and interrelationships of various elements and processes in economic growth, these aspects will be debatable judgements and more subject to questions of diplomacy, sovereignty and national interest than to specific logic and analysis.

Dr. Sen also uses the term "normal" imports. This is an extremely fluid term. It is unlikely that the U.S.D.A. would be willing to use the same definition of normal for soybean oil, cotton and dairy products. Also, it is very difficult to define practical ways to implement "normal sales in the world market" without specifying quantities for individual countries.

Points of Agreement

Both Drs. Schultz and Sen are to be congratulated on papers which pose important issues. I do agree that the imprecise allocation of accounts substantially overstates the value of P.L. 480 exports. Both domestic agriculture and ocean shipping should be charged with some of these costs.[2] I also believe that our accounting should encompass all export programs; not just some.

I share a concern in the need to expand agricultural productivity in underdeveloped areas as an essential element of economic development, even if the increased output be in wheat, cotton, rice and tobacco. There is reason to think that the existence of special export programs has reduced the pressures on Planning Commissions and Ministries of Agriculture to solve their food problems. Thus the whole range of needed

[2] Some releases from the U.S.D.A. include the entire cost of P.L. 480 as a charge to agriculture; more recent estimates recognize that this item has multiple benefits.

agricultural development programs may receive inadequate attention—in other words, factors which shift the supply function are not given enough emphasis.

Both authors also point to large unused balances of local currency in some countries as a serious issue, as well as the loan policies when such currencies are allocated to various internal programs. Certainly this can become serious, if we continue to view them as something like dollars in their command over resources. These problems will differ by countries, depending upon the excellence of or the lack of development programs and means to implement them; in some cases a few well chosen projects are all that can be attained. Weak fiscal and monetary controls will quickly dissipate the worth of these currencies in other countries.

These discussions point out that national and international policy are closely interrelated. They cannot be analyzed and kept in separate boxes. Both papers and this comment, I fear, point to many needed facts and unsolved problems, to which much more attention should be given.

IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON DEVELOPED ECONOMIES AND FOREIGN COMPETITORS

CHAIRMAN: SHERWOOD O. BERG, UNIVERSITY OF MINNESOTA

THE COMPETITOR'S PERSPECTIVE

ERIK MORTENSEN
*Ministry of Agriculture, Copenhagen**

IN MY attempt to draw an outline of the competitor's perspective I take it for granted that the competitor is a country engaged in normal commercial export of a commodity subject to surplus disposal by other countries. Thus the competitor under our observation is not yet engaged in foreign surplus disposal, though he may eventually be forced into such practises at a later stage.

Secondly, I assume that "foreign surplus disposal" does not necessarily mean U.S. disposals in foreign countries, but disposals of surpluses produced in any foreign country. The Havana Charter in its Article 32, setting up the earliest recommendations for surplus disposals, referred to liquidation of stocks accumulated for noncommercial purposes. The term surplus disposal is frequently used in a restricted application, reserved for those programmes under which the commodities concerned are offered to overseas buyers on special, unorthodox terms.[1] The FAO Consultative Sub-Committee on Surplus Disposals (C.S.D.) set up in Washington, D.C. in 1954 agreed in 1958 to the following, more elaborate definition:

> Surplus disposal of an agricultural commodity in international trade is an export operation (other than a sale covered by an international commodity agreement) arising from the existence or expectation of abnormal stocks and made possible by the grant of special or concessional terms through government intervention.

The concessional terms may relate to price or to other conditions of sales or payment. The definition enables the C.S.D. to deal also with transactions in commodities not officially labelled as "surplus" by the exporting country itself. According to the FAO Committee on Commodity Problems (CCP), "an export operation should not be considered a surplus disposal merely because there was an element of subsidy to bridge the gap between the domestic and export price." The nature of the terms and/or the

* This paper does not necessarily represent the views of the Danish Ministry of Agriculture. It is the author's personal evaluation of the impact of foreign surplus disposals on competing exporting countries.

[1] John M. Clark, "U.S. Surplus Disposals," *Quar. Rev. Agr. Econ.*, Canberra, Jan. 1956.

quantities and rates of movements should be regarded as of primary importance. Export operations carried out by non-governmental organisations, such as marketing boards, should be included.[2]

The FAO concept is still a restricted one, probably determined by the need of limiting the range of problems referred to the Sub-Committee in Washington. It limits the concept to storable, non-perishable commodities of which excessive stocks have accumulated—or are expected—and which are subject to disposals of a *particular* character. It hardly covers regular subsidized export of commodities, subject to price support and steadily produced in excessive quantities. If the surplus disposal by means of subsidies is efficient and speedy enough to keep stocks at normal level, there is not even an expectation of abnormal stocks and thus no surplus disposal according to the restricted definition. It also excludes disposals of accumulated stocks domestically through cuts in traditional imports.

So long as the surplus problem could be considered a temporary one, the limitation of studies and consultations to the "special" disposal programmes was practical and reasonable. However, as experience points towards a more permanent problem, a satisfactory analysis of surplus disposal activities necessarily leads into an investigation of agricultural price support policies as well. If surplus disposals are the symptoms to which attention first has been drawn, the disease is the artificial production incentives which distort equilibrium between supply and demand, for storable as well as for non-storable commodities. Hence the consultations and discussions in FAO, GATT, OEEC and other international agencies have gradually shifted the emphasis from the narrow disposal problems to the broader aspect of agricultural support measures.[3] Your competitors find this change of focus sharpening the picture.

The minutes and reports of the C.S.D. reflect the views of a number of competitors complaining about specific disposal programs. The complaints put before the Committee have to a great extent focussed attention on transactions under the Agricultural Trade Development and Assistance Act of 1954, the U.S. Public Law 480, and its extensions, especially since the intensification of the operations from the second half of 1956. Transactions under Title I, sales in local currencies and barter transactions under Title III have frequently been subject to discussion, whereas grants for famine and other relief purposes (Title II) have been met with general sympathy.

Besides sales in local currency and barter arrangements, sales on a competitive bid basis and triangular trade transactions involving surplus

[2] FAO, Report on the FAO Principles, CCP/CSD/59/23, 22 May 1959.

[3] An elucidative review of the surplus disposal considerations by FAO and other international agencies has been presented by Dr. Frank Shefrin: "FAO and the Surplus Problem," *Agriculture Abroad*, Dept. of Agr., Ottawa, 14:46-57, Oct. 1959.

agricultural commodities have been of particular interest to the C.S.D. The three-year agreements with India and Brazil, signed late in 1956, also caused discussions because of the volume of commodities involved.

The commodities covered by the C.S.D. consultations were wheat, cotton, oilseeds, fruit and poultry, besides dairy products which received major attention. The principal dairy exporting countries have filed complaints regarding surplus disposals of butter and dried milk, including subsidized exports. In this case the searchlight was directed as much against various European countries as against the United States and Canada.

The complaints have been concerned with the formal procedure as well as with the effects on international market prices and patterns of trade. The FAO Principles of Surplus Disposal and Guiding Lines, recommended by the Conference and formally accepted by about 40 countries have undoubtedly made a valuable contribution to maintaining orderly marketing during surplus disposal transactions. Moreover they contain sensible recommendations regarding long-term agricultural policies related to production and marketing.

However, it may be said about these principles as about the Ten Commandments: They are generally considered good for other people. Violations are seldom admitted, and if occasionally so, they are always covered with many excuses.

It is beyond the scope of this paper to investigate the specific commodity situations in which surplus transactions have been carried out. The C.S.D. itself has found that task beyond its capacity, and its influence has been achieved through frank discussions between the interested parties, not through comprehensive analysis which ultimately might lead to specific conclusions and passing of judgment.

II

Which lessons may the competitor draw from the discussions of the C.S.D.?

1. The policy of the United States and few other countries, officially to declare certain commodities as "surplus commodities," has the merit of bringing the problems to the attention of their competitors in time.

However, certain disposal transactions have been prepared in such detail before consultations with competitors could take place, that no essential modifications of the programs were possible. The U.S. Government has defended this procedure as a necessity. Many negotiations with recipient countries are required before any Public Law 480 agreement, and the U.S. agencies have, when they considered it appropriate, at an early stage held informal discussions with representatives of other exporting countries. In the C.S.D. the individual agreements have not stood alone

as single items of consultation, but the discussions of the separate agreements have served to provide examples of trade in which other countries have an interest. To safeguard the competing countries' reasonable interest in these matters, it may not be sufficient to invite their representatives to "keep in close touch with the responsible agencies of the U. S. Government and keep these agencies fully informed of their trade interests and the principles which will be advantageous from their point of view."[4] Dr. John H. Davis in his address to the FAO Sub-Committee in 1958 admitted openly that "until recently the U.S. has shown considerable hesitance in discussing major problems and policies with this group."[5] Nevertheless, consultation procedures have improved, and the U.S. Government has frequently been praised by competing countries on this particular point. Violations against the proper procedure are more frequent regarding disguised surplus disposals from countries who do not declare agricultural surpluses though they actually engage in true surplus disposals.

2. The weakness of consultations, bilateral as well as multilateral, is primarily due to the fact that the surplus disposing country and the recipient countries could not be expected to evaluate the risk to other countries objectively against their own interests. Moreover, the number of developed countries, heavily dependent on agricultural exports, is rather limited, and the less developed countries, though primarily dependent on export of some primary products, including agricultural raw materials, are frequently recipients of other surplus commodities. Canada, New Zealand, Australia, Denmark and the Netherlands, all five examples of efficient, low-cost producers for what may be left of a world market, can hope to persuade other countries to comply with good old rules of fair competition, but the majority of industrialized countries are so deeply involved in agricultural protectionism and aggressive export-promotion, that they will only reluctantly condemn their fellow travellers under accusation. Expressed in more academic terms: the policies of the two groups of countries are based on entirely different sets of values.

While recognizing that there has been some improvement in the procedure of disposal due to effective bilateral as well as multilateral consultation, Canada, according to statements before the C.S.D., continues to be critical of the indiscriminate use of barter transactions and sales for local currency which disregard the safeguarding of commercial markets.

3. The acceptance of the FAO Principles by countries primarily dependent on foreign outlets for their agricultural products demonstrates that these countries have recognised the necessity of surplus disposal. As

[4] Statement by the Delegate for the United States, 32nd meeting of the FAO Sub-Committee (C.S.D.), 8 Feb. 1957 (CCP/CSD/57/7).

[5] CCP/CSD/58/38, 4 Sept. 1958. See also Dr. Davis' paper: "Agricultural Surpluses and Foreign Aid," *Amer. Econ. Rev.*, Vol. XLIX, May 1959.

stated in the Washington Sub-Committee by the Delegate of New Zealand:

> If surpluses exist they must be moved into consumption somehow. The political and economic climate of the world will no longer tolerate the destruction of foodstuffs, even if their production resulted from national price support or production encouragement policies that are irrelevant to the market possibilities offering on normal commercial terms.[6]

The acceptance has been made in the hope of lessening the evil by the establishment of certain traffic rules on the world market.

4. The accumulated excessive stocks of storable commodities or expected excessive supplies of less-storable or perishable products have a depressing and destabilizing effect on world market prices. Hence the major suppliers to the world markets of these commodities have a substantial interest in the elimination of the excessive supplies through orderly disposal. Though the quantities disposed of by surplus transactions may be only marginal to the total output of the surplus exporting country or to world trade in that commodity, the effect on prices may be substantial. It is not difficult on the basis of ascertained price-elasticities to calculate the effect on world market prices of sizeable stocks, offered for sale either on a competitive bid basis or on special favorable terms.

When the U.S.D.A. in 1956 announced its intention to change its price policy for cotton in order to sell not less than 5 million bales in one year, almost twice the amount exported annually in the previous years, the losses of foreign exchange to other cotton exporting countries were calculated at $40 million a year for each cent a pound price drop. Or if the U.S. displaced 2 million bales of their exports, the foreign exchange loss would cost them about $350 million a year.[7] In the case of cotton the "competitors" are not countries with advanced economies and fairly high incomes but countries in great need of development such as Mexico, Pakistan, Peru, and Egypt, Brasil, Turkey and Sudan. An editorial in the *Washington Post and Times Herald* on March 2, 1956, concluded that: "the method selected for the sale of cotton implies a double price system and a form of dumping—both practices that the U.S. have vigorously opposed when adopted by other countries."

Statements by members of the C.S.D. regarding the discrepancy between domestic and export prices of butter and the dumping effect on prices in the important U.K. butter market might also be referred to. Another example would be the price-depressing effect of the U.K. exports of surplus eggs to Western Germany a few years ago. At that time the U.K. Government paid their producers as much per kilogram in subsidies

---

[6] Statement by the Delegate for New Zealand: Sales of surplus butter in the U.K. by various European countries, CCP/CSD/58/34, 24 July 1958.

[7] *Business Week*, March 10, 1956, and CCP/CSD/56/50, 26 April 1956.

alone as the Danish farmer could get at first point of delivery. (The U.K. was until the second world war the major outlet for Danish egg exports.) As an important and traditional producer of wheat, dependent on the export market for the sale of 60 percent of her production, Canada has repeatedly emphasized its vulnerability to any economic or political forces contributing to instability of international wheat markets.

The fact that world market prices of cereals, cotton, dairy products and others are depressed by export subsidies or sales on special terms is being used as an argument for separating domestic prices from export prices, also in countries which normally are linked to the world market. Traditional as well as "sophisticated dumping," as Willard Cochrane has named it, thus has a tendency to spread and to deteriorate markets further.

5. The C.S.D.'s 1959 report[8] on the FAO principles frankly admits that "it is becoming increasingly difficult to determine what would be normal patterns of trade," due to the persistence and acceleration of government-sponsored export and other types of government interference. The committee further admits, that "it is equally difficult to assess the extent to which surplus disposal operations by themselves interfere with normal patterns of production and trade." The efficient, competitive suppliers to the world market can fully endorse the Committee's conclusion "that these difficulties enhance the necessity for adequate safeguards against harmful interference." The question is how to do it. Here again the disposing and the recipient countries interpret the facts differently from the competitor. To determine the "normal" share, the surplus disposing country will chose a base period favorable to its exports of the particular commodity involved. Thus it may be 1934-38, 1924-28 or 1910-14 or any other period, regardless of the actual changes in the country's ability to compete. If a former exporter through his domestic price support measures, based on a misleading parity concept, has priced himself out of the world market, he will still claim his "normal" share, and consider dumping exports justified. If his ability to compete has improved in other fields, agricultural or industrial, he will at the same time defend his expanded trade in such commodities. That is a happy cross-breed of static and dynamic concepts, allowing him to eat the cake and to keep it. A similar difficulty arises regarding measurement of the "additional consumption" which should justify sales on concessional terms in aid of development. There is no objective base of comparison.

Thus the FAO Sub-Committee may only record the pros and cons. Nevertheless, U.S. barter transactions prior to modifications of the program in May 1957 have admittedly interfered not only with Canadian commercial sales but with the United States' own dollar sales as well.[9]

---

[8] CCP/CSD/59/23, 22 May 1959.

[9] John H. Davis in paper quoted above.

6. The competing exporting countries have undoubtedly lost any hope of seeing the surplus problems solved within a reasonable time. The FAO Conference already in 1957 reported that the problem, "at first regarded as a short-term one, now appeared to have become a permanent structural problem of agriculture in some countries," and the C.S.D. in its 1959 report said that "the movement of agricultural surpluses into export, whether by concessional sales, barter or donation, has not prevented the further generation of surpluses. Indeed the general effect may have been to delay actions that might have reduced surpluses."[10] The wise recommendations adopted in the FAO Guiding Lines from 1954[11] have apparently had little practical effect. They stressed the need to take parallel measures to avoid the accumulation of new surpluses through expansion of consumption as well as through discouragement of uneconomic production, less restrictive trade policies and policies of full employment and of economic development.

The failure of preventing further accumulation of surplus stocks has nevertheless shifted the emphasis from foreign surplus disposal procedures to basic economic, agricultural and trade policies, as may be seen from the working program of FAO, GATT and OEEC. Implementation of new policies is, however, a greater task than passing of resolutions and vague recommendations.

III

At this point I wish to pass a word of warning against the deterministic philosophy which in fact defends surplus accumulation and excessive supplies of food and fibers primarily as a consequence of our technical progress in agriculture. This view is a popular one among producers and farm politicians all over the world claiming further support from the treasury and anxious to detract attention from basic weaknesses of inherited agricultural structures. If surpluses are the result of endogenous factors, these are a complex of technical and economic or sociological elements. Unemployment in the pre-war period has frequently been considered endogenous to our industrial, free enterprise society with its rapid flow of innovations. Economic theory since Keynes and applied fiscal and monetary policies, national as well as international, have taught us something else. The many post-war predictions of "the coming crisis" have at least until now been false, and the rather successful achievements in defeating depressionistic forces at an embryonic stage may indicate how much we are able to control economic development if we apply a more constructive policy than in the past.

Whereas fiscal and monetary policy has changed, agricultural policy is

[10] CCP/CSD/59/23, 22 May 1959.
[11] CCP 54/13, par. 15-21.

still dominated by traditional pre-war thinking. The parity concept, or rather its interpretation, has in most countries brought about an agricultural policy based more on static than dynamic concepts. Protection has been granted by import restrictions, and price supports at levels substantially above world market prices have encouraged production and discouraged basic changes of agricultural structure.

Many European countries, among which some are highly industrialized, have entirely neglected land reforms and maintained farming systems of a medieval type, abandoned by Denmark nearly two centuries ago. Efficiency or productivity in these countries has generally remained low, compared with Denmark, the Netherlands or the United Kingdom. Exceptions are to be found in horticulture, especially well suited for intensive cultivation of small plots of land. In spite of price incentives, new techniques dependent on mechanization have not been utilized because of parcellation of land and underemployment of the family on small farms. Land tenure systems and gross profit sharing (metayage) have also had a discouraging influence on the operator's own investments and input. The percentage of population in agriculture has remained high. Only the increasing rate of industrialization and the full employment in that growing sector has generated a movement of labour out of agriculture. If continued, this will increase farm wages and help to overcome the inertia in changing farming systems and to bring adoption of new techniques, including mechanization.

The extent to which many new techniques are applied is, however, not independent of the expected level of farm prices. If the agricultural protection in the six countries now forming the European Common Market are continued as indicated by the high level of the common tariffs and the rigid control of imports through the proposed market schemes, it is most likely that surpluses of wheat, sugar, fruit and vegetables, milk products, meat and eventually certain types of tobacco may occur.

If the socialist countries behind the iron curtain would give their farmers more incentives to increase output, new techniques would certainly be applied jointly with larger input.

In the United States and Canada production incentives are high, and contrary to many European countries, land distribution favors utilization of new techniques, especially mechanization. However, I doubt that introduction of new techniques, involving larger investments, is independent of the incentives, including the expected maintenance of present support levels.

According to Willard Cochrane, "the aggregate output of agriculture is outdistancing a very rapid rate of population growth in the United States by more than one-half of one percent per year." Referring to the low income elasticity of raw farm products he expects a further increased

downward pressure on farm prices (or under price supports, a widening of the annual rate of surplus.)[12] The solution he finds in a marriage of foreign surplus disposal and comprehensive supply control. The foreign competitors fear that foreign surplus disposal might be the dominating part in this marriage, and would at least recommend an extended period of engagement. Nevertheless, the proposed supply control is one way of bringing output in line with demand. To the foreign competitors it is the result and not the instrument which is of major importance.

In view of the fairly high and stable employment and continued increase of industrial output, the justification of the present high support level in the U.S. might indeed be questioned. I do not concur with the view that this high support level has only a secondary responsibility for the dramatic increase in inputs of new kinds of nonfarm capital since the war. It might be appropriate to suggest reconsideration of D. Gale Johnson's question from 1947: Is there any way that (the U.S.) agricultural programs and trade policy can be made more compatible?[13] The competing low-cost suppliers and other countries favoring a freer world trade would not consider permanent surplus disposals as the proper way.

IV

In his statement to the C.S.D. in September 1958, John H. Davis suggested a more serious study of the potential of farm surpluses as a positive force in foreign policy. The hope that U.S. surpluses would be of short duration had been unrealistic, he said, and it was almost certain that sizable farm surpluses would continue for another five to ten years, as well as a program of the P.L. 480 type. Among the issues to be considered he pointed at the internal agricultural adjustment problem as well as the relation to other exporting countries.

Cochrane in his presidential address to the A.F.E.A. last year asked for "some policy commitments of long-run duration with respect to program objectives, availability of supplies, means of financing and so on." He suggested foreign disposals exclusively to finance economic development, except in famine situations, and supported the view that once "surplus" agricultural commodities become committed to a development plan "the whole operation ceases to be a foreign surplus disposal operation." By this *deus ex machina* trick they leave the stage and reappear as "development supplies" with a claim on domestic production in the same sense as the School Lunch Program and the International Wheat Agreement.

The competing countries, however, could not entirely cut them out of

[12] Willard W. Cochrane, "Farm Technology, Foreign Surplus Disposal and Domestic Supply Control," *J. Farm Econ.*, 41:886, Dec. 1959.

[13] D. Gale Johnson, "Reconciling Agricultural and Foreign Trade Policies," *J. Pol. Econ.*, 55:567-71, Dec. 1947.

mind, for the reasons mentioned earlier: i.e. sufficient assurance of additionality and noninterference with normal patterns of trade. According to Cochrane, competing countries burdened with agricultural surpluses should be invited to participate in the "food for development" program, eventually under the sponsorship of the U.N. But competing countries, some of which derive a substantial part of their national income from agricultural exports, could not solve their balance of payment problems by commitments to sell a larger or minor share of their export products at give-away prices.

The proposal reopens the discussion pro and con agricultural trade under a two price system as we remember it from the FAO preparatory committee on a World Food Board back in 1946. As pointed out by the U.K. delegation[14] to that commission, the normal importing countries might also object to a system of permanent price discrimination, if they would have to pay basic prices for foodstuffs high enough to enable part of the world supply to be distributed cheaply or as a gift to others. Reference was made also to the abnormal policy of selling an additional agricultural output at a lower price in spite of the fact that an extension of the margin of production normally takes place at higher cost to the marginal producers. In 1946, sales under a two-price system were considered a temporary, emergency measure. Today some of our American colleagues recommend them as a permanent instrument. Though it should not be overlooked that Cochrane's proposal is linked to a system of supply control, the idea does not appeal to foreign competitors.

According to GATT "the U.S. agricultural exports under special programmes have attained truly remarkable levels, reaching in 1956/57 no less than $2000 million or over 40 percent of total U.S. agricultural exports." Even as part of a development program, competing countries, heavily dependent on agricultural export, could not be expected to approve continuation of such trade practises on that scale. Contrary to the recent U.S. policy, the Haberler panel of experts[15] recommended aid to underdeveloped countries to be expanded in the form of direct financial aid with as little reliance as possible upon aid which is tied to particular commodity supplies. That report and its recommendations seem not to have got all the attention they deserve.

V

An international program for development should not be designed as a by-product of domestic American price support operations. It should be designed for its own purpose. Any need to raise the incomes from farming

[14] FAO Preparatory Commission, World Food Proposals, Doc. 81, II/29, 20 Nov. 1946.

[15] Trends in International Trade, A Report by a Panel of Experts, GATT, Oct. 1958.

in rich industrialized countries could be met without undermining the economy of those countries that have established an efficient agricultural industry without protective measures. Income support, if necessary, could be granted by means which do not affect the marginal costs or prices of any single product. On these matters it might be worth while to study the report from the Haberler panel once more. Many harmful price support measures, including import restrictions and dumping of surpluses, could be avoided without any basic changes in the redistribution of incomes which is the primary function of agricultural policies in most countries, but the high level of employment in industrial countries might further invite a reconsideration of the level of protection, which retards the desirable flow of manpower from agriculture to other industries. Haberler and his colleagues recommend some gradual moderation of the degree of agricultural protection in importing and exporting countries, aiming at an expanded trade in agricultural as well as in industrial products. A real long-term policy is needed.

I can agree with Leslie A. Wheeler that with the many exceptions made to the GATT rules (and FAO principles) "the result has often been to permit individual countries—e.g. the United States—to pursue, with very little hindrance, unilateral policies contrary at least to the "spirit" of the General Rules of GATT."[16] To weaken the rules further to comply with protectionistic practices would only be desirable if such practices were in conformity with a rational international economic policy. We do not recommend changes of traffic rules just because of violations. Mutual action to remedy the injury or prevent the threatened injury from import of dumped or subsidized products as visualized in the EFTA agreements, paragraph 17, seems to be a less defeatist approach to the problem.

It is one of the achievements of GATT to consider international agricultural policy as a part of a general constructive world economic policy. Within such a framework the efficient, competitive agricultural exporters may reasonably question the justification of other countries' protectionistic and aggressive policies, inherited from the age of world depression, unemployment and economic anarchy.

[16] Leslie A. Wheeler, *The New Agricultural Protectionism and Its Effect on Trade Policy*, Committee for a National Trade Policy, Inc., Jan. 1960.

IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON DEVELOPED ECONOMIES AND FOREIGN COMPETITORS: THE INTERNATIONAL PERSPECTIVE

MORDECAI EZEKIEL
*Food and Agriculture Organization of the U.N.**

IN THE past crop year, most surpluses showed little or no decline, despite a poor wheat crop in the U.S. and drought in northern and central Europe. The world's current end-season carryovers in major exporting countries show wheat continuing at almost two billion bushels, and feed grains at over three billion bushels. Cotton and dairy products show moderate declines, but a new butter problem is expected, and rice supplies are expanding. Even with large surplus disposals in the picture, stocks are still enormous.

When our FAO international Grains Group agreed in 1958 that the grain surplus situation was a continuing problem rather than a temporary one, that was quite a sensation. In 1960, when 51 countries attended the meetings of the Committee on Commodity Problems and the Grains Group, the acceptance of the surplus situation as a chronic one for long ahead created no surprise.

Yet economists proved long ago that surpluses cannot exist. Equally impossible, under received theory, are industrial prices which keep on rising even when demand falls. Considering an economic world populated by such living ghosts, we must walk warily to make sure our own analyses are not tinged by theories equally irrelevant for the present-day world.

With this brief introduction, I will devote myself to five main points:

1. How surplus disposals affect the bystander countries.
2. The basic economic conditions for using surpluses for economic development.
3. International action with respect to surplus disposal.
4. Does surplus disposal in practice work in line with the theory?
5. The probable future of surplus disposal.

I. *Effect on "Bystander" Countries*

Preceding speakers have dealt with the interests of countries that produce and distribute surpluses on special terms; of countries that receive them; and of competing exporters that fear loss of their markets. The direct impact on other countries seems to be mainly through the limited

* Although the author is naturally drawing on his knowledge of FAO's work and activities in this statement, he is speaking in his personal capacity as an economist, and not as indicating FAO policies and points of view except where explicitly stated.

sales under the triangular arrangement provisions of P.L. 480—such as, for example, sending surplus wheat to Switzerland, in exchange for hydroelectric equipment to be delivered to an underdeveloped country. Such a transaction no doubt helps the third country, but does not seem likely to increase wheat consumption in Switzerland or to add to the total consumption of wheat. In fact, it operates like a commercial purchase for the Swiss. Much the same is true of barter transactions. Such operations have been vociferously supported by the private traders who profit by arranging them. The Administration has, to its credit, opposed them, and fortunately in general they have been held to relatively small amounts out of total disposals.

The countries of Europe contributed to the world increase in farm production in the decade after World War I, by greatly increased tariffs and other protective measures.[1] Since World War II, especially in the 1950 decade, European agriculture has gone through a veritable technical revolution, with yields per acre increased more in one decade than in the previous three or four, almost half the horses replaced by tractors, and a rapid reduction in farm population. Concurrently, trade barriers and agricultural price supports have continued or have been raised.

The new policies now being developed by the European Common Market may tend to make their food production rise even more than their food consumption, and additional European countries may enter the ranks of steady food exporters. In addition to the rapid upsurge of agricultural technology in all advanced countries, farm price or income support policies in traditional importing countries have contributed to the appearance and maintenance of surpluses, along with parallel policies in the U.S., and less markedly in some other exporting countries.

Europe has long shared heavily in financing the development of the rest of the world, and in recent years has contributed about half of the total international economic assistance. European countries now are considering expanding still further their economic aid to less-developed countries generally, and are considering procedures to this end.[2] The use of surpluses to help finance economic development might reduce the amounts of financial assistance that European countries contribute, or might increase the total amount of development resulting from the cash investment. In either case, such use of surpluses would speed progress toward the end European countries are now preparing to support more

---

[1] World Trade Barriers in Relation to American Agriculture, 73rd Congress, 1st Sess., Senate Doc. No. 70, U.S. Govt. Printing Office, Washington, 1933. See also Mordecai Ezekiel and Louis H. Bean, *Economic Bases for the Agricultural Adjustment Act*, pp. 13-20 (U.S. Dept. of Agri., Dec. 1933, 67 pp.).

[2] W. Randolph Burgess, Bernard Clapper, Sir Paul Gore Booth, K.C.M.G., Xenophon Zolotas, "A Remodelled Economic Organization," OEEC, Paris, April 20, 1960, 69 pp. mimeographed (see p. 21).

energetically. These countries, too, thus have a definite interest in the amount of surpluses made available for economic development, and the effectiveness with which they are used.

II. *The Basic Economic Conditions for Using Surpluses for Economic Development*

The detailed economic rationale of the use of surpluses to help finance economic development in recipient countries was first worked out in 1953/54. This investigation, which I made personally with the assistance of economists in India, and in consultation with Rodan-Rosenstein, examined a number of theoretical and practical aspects.[3] It led to the conclusion that where there was idle manpower in the recipient country, and if proper precautions were observed, surpluses could be used to offset part of the increased demand for food which would result from putting part of the idle manpower at work on new capital-formation projects. Since the surpluses would go into additional consumption they would not reduce domestic markets for domestically produced food, or reduce demand for food supplies previously or usually imported. One of the necessary conditions was that the increased expenditures on new employment would be concurrent with, or at the same rate as, the sale of the surplus food in the domestic market, and that distribution and sales would be so handled as to affect the same local market areas. Men do not live by food alone, and surpluses cannot cover the whole range of food requirements. The part of the increased consumption resulting from the increased employment not satisfied by surpluses would need to be met either by increased output from domestic industries previously operating below capacity, such as textile mills, or by increased imports financed by additional financial assistance made available to the recipient country.

The study also explored a number of concrete potential development projects not in the existing Indian development program, and examined for each project how much of the additional expenditure, direct and indirect, would be for labor, how much for transportation and other goods and services domestically produced, and how much for additional imported goods or services. Studies were also made, from existing data and from new field surveys, of how much demand for individual foodstuffs would expand if more men were put at work on new projects in rural areas, and how much of these new demands could be satisfied by use of available surplus foods. In India incomes are low and elasticity of demand with respect to income is quite high, even for grains. The study concluded that under those favorable conditions, and with a wide "market-basket" of many surplus foods including some preserved meat and

[3] *Uses of Agricultural Surpluses to finance economic development in Under-Developed Countries*, A Pilot Study in India; Commodity Policy Studies No. 6, FAO, Rome, June, 1955, 65 pp.

dairy products, only about half the capital cost of the additional development projects could be offset by surpluses (valued at Indian prices). If the effects were not to be inflationary, the rest of the additional expenditures would need to be offset by other measures already mentioned. However, this assumed all the surpluses would be available on a grant or loan basis. If part of the local currency proceeds were used to replace foreign currency payments in the country, as for Embassy construction or for payments for employees or services, surpluses so paid for could not be counted as contributing to the financing of economic development. Neither can surpluses given to relieve famine conditions, nor those placed and held in national reserve stocks.

In asserting that surpluses can be used *either* to increase consumption *or* to finance economic development, Dr. Schultz has misunderstood the analysis. Surpluses can be used merely to increase consumption, as in famine relief or school lunches. But they can also be used *both* to increase consumption of workers and their families by putting unemployed men at work, and simultaneously to create new capital goods from their work. This process thus transforms the capital locked up in surplus stocks into productive capital in new physical facilities—or even in trained men.

III. *International Action on Surplus Disposal*

The 1953 session of the FAO Conference recommended that surpluses should be disposed of in an orderly manner to prevent sharp price falls in world markets, especially where prices were already low, and "without harmful interference with normal patterns of production and international trade," and directed further study of means and principles for surplus disposal by the Committee on Commodity Problems (C.C.P.).[4]

This Committee then developed both a set of guide lines for surplus disposal, and a proposed set of principles, which emphasized, among other points:

(1) that surpluses sold on concessional terms should harm competing exporting countries as little as possible;

(2) that surpluses for development should be absorbed "by *additional* consumption, which will depend, *inter alia*, on the net increase in purchasing power resulting from total new development expenditure, and on the extent to which such additional purchasing power will be directed to purchases of the commodities supplied on special terms."[5]

The Council of FAO, in late 1954, asked governments to indicate whether they would adhere to the "Principles of Surplus Disposal," and

[4] Report of the Seventh Session of the Conference, 23 Nov.-11 Dec. 1953, par. 92 FAO, Rome, 1954, pp. 256.

[5] Disposal of Agricultural Surpluses, and Principles Recommended by FAO, FAO, Rome, Dec. 1954, pp. 17.

requested the Director-General to make the field study mentioned earlier. Since then 44 countries have accepted the FAO principles. Surplus disposal developments are discussed annually or semi-annually at the meetings of the C.C.P., the FAO Council, and biennially at the world-wide FAO Conference. Although the Principles have been often debated since, they still stand without change. The same principles were generally reaffirmed when a Wheat Utilization Committee was set up in May 1959 by the five leading wheat exporting nations to help expand and coordinate wheat surplus disposals.[6]

IV. *Does Surplus Disposal in Practice Work in Line with the Theory?*

I will limit this phase of the discussion to surpluses used for economic development. Under the agreements entered into between the U.S. and recipient countries a good part of the "foreign currency proceeds," usually ½ to ¾, have been turned back to the recipient country for its economic development, while another part has been used for private investment to the same end.[7] To this extent these resources have become available for helping to finance development expenditure. No cases have been recorded where surpluses have been part of a "package deal," as was suggested in the Indian Pilot Study, under which other resources would be provided in cash to finance that part of the increased consumption that could not be met by surpluses or by increased domestic production in the recipient country. The International Bank and other international financing institutions at times may have judged that countries which had made large surplus agreements had thereby become more "credit-worthy," and so could obtain more financing. A detailed study of such financial transactions, in their relation to surplus agreements would throw more light on this aspect of the question.

It is clear, however, that the terms of surplus agreements between the U.S. and recipient countries have put more emphasis on protecting the maintenance of commercial imports through specific clauses than they have on preventing the disposal of the surpluses from discouraging increased production by farmers in the recipient country, as Dr. Schultz fears. Although the agreements have sought not to damage international trade, other competing exporters are not always satisfied with these arrangements, as shown, for example, by Thai and Burmese complaints about the recent U.S./Indian agreement. Any impact in the recipient countries has been left to those countries themselves to deal with.

Efforts of the C.C.P. Washington Sub-committee on Surplus Disposal

[6] Joint Communique, Food for Peace Conference, The White House, Washington, May 6, 1959.

[7] M. Ezekiel, "Apparent Results in Using Surplus Food for Financing Economic Development," *J. Farm Econ.*, 40:915-23, Nov. 1958.

to develop studies of what has happened in recipient countries have encouraged several U.S. colleges to seek funds for such studies, and one or two are under way but have not yet been published. FAO itself has made one study, for Japan, and another for Pakistan will be completed and published shortly. The Japanese study[8] indicated that in that country the grants in general had worked out as expected, with additional employment produced, previous imports maintained, and no depression of returns to farmers (this latter, however, thanks in part to an effective domestic price support system). Japan used its surplus commodities to finance specific additional projects added to its development program.

In India the surpluses have been used till now to help finance the program as a whole—or rather, to prevent cutting the total of the planned program as much as it would otherwise have had to be cut. It is difficult to untangle the threads of cause and effect, and to compare what did happen with what might have happened had surpluses not been available, and had fewer rupees been spent on economic development. A hasty review of Indian statistics since the 50's, and discussions with leading Indian economists, do not indicate a reduction in the price level for wheat as a result of the wheat disposals; on the contrary, the real price for wheat (compared to manufactured products) showed no downward trend over the decade, and even a rather strong advance recently.

In preparing its new 5-year program,[9] India has made allowance year by year for the part of the rupee financing to be obtained by domestic sale of surpluses, larger in the early years of the 60's, and progressively less later on. Dr. Sen has said more on all these points.

Surplus disposals for economic development in Japan and in India have thus apparently worked out along the general lines indicated as desirable by the Pilot Study. Much less information is available on similar operations in other countries. Little effort appears to have been made by donor or recipient countries to determine, either in advance or after the event, how far the demand conditions in the recipient country or the kind of projects financed, met the conditions indicated by the Pilot Study as necessary for the surplus disposals to be fully balanced by increased consumption. If some damage of the sort feared by Dr. Schultz has happened in some countries, it would not be surprising, in light of the neglect to try to work out in practice in each country the safeguards which the Pilot Study indicated as necessary in theory. The international mission sent recently to several Far Eastern countries by the Wheat Utilization Committee may mark a new step toward a more careful advance planning of

[8] *A Note on the Utilization of Agricultural Surpluses for Economic Development in Japan*, U.N. and FAO Doc. E/CN.11/L.60, Bangkok, 1958, 46 pp.

[9] *Third Five Year Plan, a draft outline*, Planning Commission, Government of India (esp. p. 49), Delhi, June 1960, pp. 265.

surplus projects and operations. Economists will be in better position to judge of that when the report of the mission is made public.

Dr. Schultz is correct in one respect, and that is that most underdeveloped countries have given little attention to raising prices direct to farmers to stimulate greater investment or larger output. In fact, price controls in Asian and Latin American countries have usually been employed to hold down farm prices to provide cheap food to the cities, rather than to raise agricultural incomes as in more highly developed countries.[10] The price actually received by many farmers, after paying the exactions levied by local landlords, dealers, or suppliers, is generally unknown. The nearest price reports to the farm are frequently those for local markets, at the village or regional assembling points where petty assemblers or traders resell their collection at wholesale. (In India, however, it is reported that the small proportion of commercial farmers are now largely selling their products at local markets, while more of the many smaller farmers are using cooperatives for the same purpose, and that studies of actual prices received are also under way in some areas.) More attention by less-developed countries to the differences between reported wholesale prices and prices actually paid farmers, and to the development or improvement of local marketing facilities and arrangements, or other steps which would get more of the retail price back to the farmer, might be a real stimulant to further increase in their own domestic production.

There are other possible dangers in depending too heavily on food surpluses. One of the most serious is the danger of sudden cutting off of deliveries from abroad after the recipient country has adjusted its economy to their continuous arrival. This was strikingly illustrated in 1959 when, due to drought in Europe and increased commercial demand for dry skim milk, the U.S. suddenly suspended further donations for export. This led to sharp reductions in the widespread net of school feeding programs and other arrangements in underdeveloped countries, built up over a term of years, by governmental, charitable, and religious organizations. The crisis was weathered by cutting down operations, using up stocks already on hand, and other makeshifts. Donations have now been resumed, but the dislocation in the going programs, and the damage to confidence in their continuity, was serious.

If recipient countries are to depend on surplus disposals over a term of years for a substantial part of their supply, the donating country will need to continue to carry substantial reserves to meet the contingencies of a

[10] *Food and Agricultural Price Policies in Asia and the Far East*, ECAFE/FAO Agricultural Division, U.N. Econ. Comm. for Asia and the Far East, Bangkok, 1958, 110 pp.

Report of the Latin American Center on FAO Price Stabilization and Support Policies, Santiago, Chile, 23 Feb.-6 March 1957 (Provisional Draft, mimeo., FAO, Rome, 1957) 58 pp.

bad harvest, as well as possibly taking the long-term surplus commitments into account in its own production programs. U.S. grain stocks are now enormous, but if a new drought reduced output two out of three consecutive years as sharply as in the 1930's, and if domestic and foreign commitments and demands at present levels were met, all of the U.S. existing excess grain stocks might be wiped out. Both recipient and donor countries need to take this danger into account in weighing the advantages and disadvantages of the growing dependence of economic development on surplus supplies.

While experience and research since 1954 has not undercut the basic theory set forth in the Indian Pilot Study, it has indicated some aspects which need re-examination.

For example, the marginal elasticity of demand for grain with respect to income now appears to be much higher in India than the 0.3 to 0.4 determined from information then available. During recent years, as Indian wheat production has risen, market arrivals at the city have not increased proportionately. Apparently with their cash income aided by land reform, better credit facilities, and somewhat better farm income, small and traditionally hungry Indian farmers have preferred to eat a good part of their additional production rather than to sell it. For subsistence farmers this marginal income elasticity has apparently been near 1.0. Indian economists now estimate the nation-wide elasticities as 0.6 for rural areas, and 0.4 for urban ones. The effect of these higher elasticities toward increasing the proportion of additional incomes spent for surplus products is, however, counterbalanced by the fact that the "market basket" of surpluses provided recently is not as wide as was assumed in the Pilot Study.

A more basic difference is the change in surplus disposal practice. Instead of being used to offset specific additional development projects, surpluses are now often looked on as one of the resources in an economic development program carried on at a high rate over a number of years. The elaborate computations in the Pilot Study of direct and derived income and demand from additional investment in individual projects, might work out even more favorably if recalculated on the basis of a continuing support to a continued higher rate of investment and economic development. This point needs attention in further studies of the economics of surplus disposals for development.

The need for continuity of supply in providing surpluses to less-developed countries was strongly stressed in the findings of the Brookings Conference on Surplus Disposal, so that developing countries could count on such supplies over a term of years in preparing their programs.[11] This

[11] *International Wheat Surplus Utilization Conf. Proceedings*, Dept. of Econ., S.D. State Coll., Brookings, S.D., May 1959.

point of view has since been reflected in U.S. legislative authorizations, and in the recent U.S./Indian 4-year surplus agreement. This covered 17 million tons of grain (about 650 million bushels) to be used ¾ for financing development, and ¼ for a national reserve stock. One noteworthy feature of the agreement is the provision that 40 percent of the cost to India will be a grant, instead of a loan repayable in local currencies, as compared to 20 percent in the previous agreement. This feature is a partial solution to the problem of repaying or reusing the local currency loans when they would become due, which was pointed out by John H. Davis two years ago, when he stated "The relationship of the United States with recipient countries no doubt could be strengthened materially if the United States promptly were to clarify its policy regarding accumulated funds, country by country, and then in the future, negotiate terms of currency use and reuse at the time the commodity terms are agreed to."[12]

As pointed out earlier, the part of the local currency spent by the U.S. in substitution for payments in dollars to the recipient country is equivalent to a partial payment for the surpluses in dollars. The growing volume of currency which the country owes to the U.S. is a future commitment which clearly might involve an inflationary threat for the country if the U.S. should attempt to spend it. Economists will therefore agree with Edward Mason's recent statement[13] that "all things considered, the best disposition of the vast bulk of local currency accumulations would be for us to grant them back for debt retirement or any other purpose deemed proper by the receiving country."

Surplus disposal in practice has thus justified some of the original theoretical expectations; has evolved on lines somewhat beyond those originally anticipated whose effects in recipient and other countries require much further detailed study; and has created large new problems of accounting and finance not originally explored.

V. *The Probable Future of Surplus Disposal*

This may be considered under two heads: its relation to U.S. farm policies, and to the long-range economic development of the less-developed nations.

---

[12] J. H. Davis, "Surplus Disposal as a Tool for World Development," *J. Farm Econ.*, 40:1484-96, Dec., 1958.

[13] Edward S. Mason, "Foreign Money We Can't Spend," *The Atlantic Monthly*, May 1960, p. 79.

See also Paul G. Hoffman, *One hundred countries, one and a Quarter Billion People*, p. 32, Comm. for International Economic Growth, Washington, Feb. 1960, 62 pp.

a. *Surplus disposals and farm price and income supports*

Other countries have suffered from surpluses at times, of wheat, butter, coffee, or fruit, or have disposed of surpluses under special arrangements, as under Colombo Plan financing. Other countries, with less financial resources, might be unable to plan surplus disposals as carefully as the U.S. has done. But the U.S., with its massive stocks and continuing PL-480 arrangements, obviously dominates the surplus-disposal field. The U.S. accumulation of surpluses is often loosely blamed on the Agricultural Adjustment Act of 1933. As part of an effort to adjust production to effective demand, the A.A.A. provided supplementary cash payments to producers on only the domestic consumption quota of their production of "basic" products, while all sales were made at world market prices.[14] Political pressures gradually introduced price support loans on the whole output of these products. During the war and post-war food shortages, advance price guarantees and supports were raised and widened to encourage increased output to meet actual or expected needs, and acreage restrictions were suspended when the Korean War broke out. Had the A.A.A. been kept to its original terms, incentives to produce for export would have been less and increases in U.S. yields and output might have been much less marked.

The continuing surplus problem, and the related problem of the downward trend in the terms of trade for food and raw material exports from underdeveloped countries in exchange for needed industrial imports, are both symptoms of four facts: (1) that efficiency and productivity in agriculture has risen rapidly in North America since the 1930's and almost explosively in Europe since the war, with the more intensive application of modern research and extension; (2) that most countries seem in effect, though perhaps without conscious intention, to be striving to reduce their agricultural imports and to increase their agricultural exports; (3) that in the industrial world of high and rising incomes, the marginal elasticity of demand for food with respect to income becomes smaller and smaller as income rises, while in the underdeveloped world of rising expectations and pressures for economic development, the marginal elasticity of demand for industrial imports is very high indeed, and (4) that the use of synthetic substitutes for rubber, textile fibers, oils, etc., is constantly increasing. Another, and somewhat related fact, is that in the modern world of large-scale organization and price and wage controls in industry, distribution, and labor, the farmer is almost the last atomistic competitor, despite governmental supports. Many of the arguments as to future farm policy seem to overlook these facts.[15]

[14] Agricultural Adjustment Act, P.L. No. 10, 73rd Congress (H.R. 3835), Washington, May, 1933.

[15] For an effort to arrive at internationally agreed principles in this field, see Report

The pressure for continued support to farm incomes in many developed countries reflects the feeling that their incomes are generally so low compared to other occupations[16] because of their low bargaining power in the present structure of society. But whether lowered price support would modify production and consumption on classical economic lines is far from clear. Certainly the reduction of 28 per cent in U.S. food price supports (weighted average) from 1952 to 1960 did not have any marked effects on stimulating consumption or reducing production. Although wholesale prices of food fell correspondingly, retail food prices went up by 3 per cent over the same period.

The U.S. has made strong efforts to prevent its surplus disposal on special terms from reducing commercial imports by the recipient countries. But it would be blindness not to recognize that the export of American farm products in large quantities, both commercially and under special arrangements, has been massive in recent years; and has undoubtedly had some effect on the general price level of agricultural products in world markets, which have been characterized by a continuing downward trend over the entire decade of the 50's. So sharp has been this downward trend, especially when compared with the rising costs of industrial imports, that the problem of the unfavorable terms of trade for underdeveloped countries was the main subject on the Agenda of the UN Economic and Social Council at its summer meeting in 1959. While chronic surpluses in tropical products such as sugar and coffee aggravate this situation, the continuing pressure of U.S. exports on cotton markets, and the large volume of surplus exports of wheat, corn, rice and, at times, butter and other products, have been matters of grave concern to other highly developed countries such as Canada, Australia, and New Zealand, as well as to less developed countries such as Argentina, Mexico, Burma, and Thailand, all of which depend far more on agricultural exports than does the United States. At the same time it may have held down farm incomes in recipient countries to some extent, and reduced their incentives to expand output.

U.S. export policy, however, is obviously only one facet of U.S. farm policy as a whole. The Great Debate over the future U.S. farm policy thus far seems to agree only on one thing, that recent and present farm production and income policy is unsatisfactory and needs to be changed. But it may be useful to take a brief look at the possible place of surplus disposals in some of the current proposals.

---

of the Committee on Commodity Problems, 33rd Session, Appendix A, Suggested Revision of Guiding Principles on Agricultural Price Stabilization and Support Policies, FAO, Rome, June, 1960.

[16] For relative level of farm incomes and other occupations, see FAO, State of Food and Agriculture, 1959, Rome, 1959, chapter III.

At one extreme is the proposal to abandon entirely price supports and production controls, and to allow American agriculture to find its place at competitive prices in domestic and world markets. When asked to project how such policies would work out over the next five years (with only tobacco and acreage reserve continued), a group of leading agricultural econometricians could apparently find no workable basis for the calculations, except on the further assumption that surplus disposals would continue unchanged at present levels.

Their projections show that while surplus stocks could be disposed of gradually over 7 to 10 years, farm prices would decline sharply—to $11 for hogs, 80¢ for corn, 90¢ for wheat, $3 per hundredweight for rice, 25¢ for cotton, and $15 for cattle. Farm net income would drop by about 40 per cent.[17]

At the other extreme is the proposal for "supply controls," argued so persuasively by our brilliant Past President, Willard Cochrane,[18] and based on reduction of supply to an amount which would raise farm prices high enough to put incomes for farmers' labor at a level comparable to those received by well-paid city labor. But he too assumes that surplus disposal operations would continue, as well as commercial export sales under international agreements or otherwise. Such a policy might, if it worked, be more helpful to other exporting countries than would the other extreme which would flood world markets with U.S. products at bargain prices, and probably stimulate a new rise of import barriers in importing countries. But the important point for this paper is that in both proposals, continued surplus disposals are assumed to be needed for some time ahead.

There could be more extreme proposals, of course, such as limiting production and supply to the amounts that could be disposed of at satisfactory prices without export on special terms. This would obviously involve a very great contraction of U.S. output in many farm products, and may be completely unacceptable to any group. The other extreme of a free price system without further disposal on special terms might be equally impracticable, and could certainly be very upsetting to the going world economy.

In contrast, the new Canadian system, of limiting price support payments to any one farmer to a fairly low total amount, serves to maintain the social security aspect of price supports while avoiding large payments to well-to-do large-scale producers.

---

[17] *Farm Price and Income Projections, 1960-65, Under conditions approximating free production and marketing of agricultural-commodities,* 86th Congress, 2nd Sess., Senate Doc. No. 77, Washington, January 20, 1960, 33 pp.

[18] Willard W. Cochrane, "Some Further Reflections on Supply Control," *J. Farm Econ.*, 41:697-717, Nov. 1959.

In this connection, may I make a plea that American agricultural economists give more attention to what American policies mean for the rest of the world. In the recent marathon hearings on American farm policy, very few of the distinguished economists who testified gave any real attention to the possible effect on the world markets and on other agricultural countries of the policies they were proposing.[19]

The U.S. economy is so huge, and so largely self-dependent, that U.S. citizens are apt to forget that the 5 or 10 percent of its farm production that goes into export may still be a tremendous force in world markets, with repercussions in the domestic markets of far-distant countries that may mean prosperity or bankruptcy for them. It is a complicated task to try to work out the future of world markets, and to estimate the effect of given national policies upon them. FAO, as a world organization, does do some work on those lines. I would urge American economists studying future U.S. policies to take the available world information into account, and to consider the probable foreign repercussions of their proposals as well as the immediate effects within the country.[20] Only then can the U.S. begin to see itself as others see it.

b. *Surplus disposals and the long-range development of underdeveloped countries*

Strangely, the fertile, broad, thinly populated plains and prairies, where grain and livestock products can be produced most efficiently with human labor, are mainly in highly developed countries and mostly outside of Europe. The densely crowded populations of Asia and parts of Latin American seem unlikely ever to achieve very high income standards for themselves unless, like Japan, they can develop their industries very greatly, so that eventually they can afford to buy and import a substantial part of their food requirements in return for new industrial exports. Imports of food by underdeveloped regions have trended sharply upward since pre-war days, now taking 20 percent of the world's barley imports, 40 percent of the wheat, and over 75 percent of the prepared milk.[21] Heavy surplus disposals to these areas over long periods, if accompanied

---

[19] *Policy for Commercial Agriculture,* Hearings before the Subcommittee on Agricultural Policy of the Joint Economic Committee, Congress of the United States, 85th Cong., First Sess., Dec. 16-20, 1957, Govt. Prtg. Office, Washington, 1958, 376 pp. See also Murray Benedict, "The Supply, Price and Income Dilemma," *J. Farm Econ.,* 41:173-76, May 1959, esp. p. 176.

[20] This was done by the authors of Senate Doc. 77, but apparently only in a very limited and sketchy way.

[21] Robert M. Stein: "The Regional Pattern of World Food Imports and Exports," *Weltwirtschaftliches Archive,* Hamburg, Band 83, Heft 2, 1959, pp. 253-267; "Agricultural Surplus Disposal as a Means of Financing Economic Development," *Economica Internationale,* Genoa, Nov. 1959, 20 pp.

by corresponding speeding up of their general economic and industrial development, might help advance the day when they could begin to depend on industry as well as agriculture as substantial factors in both production and trade.

A recent Syracuse University study for a Senate Committee suggested that food surpluses might be committed over a term of years to enable the recipient country to use more of its limited financial resources to push essential industrial development, and less to push agricultural, while making good the shortfalls in food needs by the large surplus supplies contracted in advance.[22] The supplying country would meantime include this fixed demand for surpluses as part of the demand to be covered in planning its production policy. This proposal runs counter to the FAO creed that proper agricultural expansion is equally vital with industrial expansion in balanced economic development. But it does recognize that in some developing countries the marginal productivity of investment may be higher in industry than in agriculture, and the reality that political pressures being what they are, some developed countries may be able and willing to contribute much more to international economic assistance over a term of years if a good part can be paid in products, such as food, which utilize existing excessive capacity in the donor country.

I agree with Dr. Sen that continued and expanding economic assistance in dollars to less developed countries is a necessary policy, along with continued or expanding surplus disposal, if maximum progress is to be made and best results obtained.

Now, one word about the place of surpluses in the FAO Freedom from Hunger Campaign. This Campaign, just launched, is a continuing 5-year effort to make the thinking people of the world more conscious of the problem of hunger and of the slow progress in correcting it. It will emphasize the known facts of the world situation and what could be done to speed its solution; and seek to create and arouse a real determination to support more active and sustained efforts to its solution, even at the cost of some personal sacrifice. The Campaign includes an informational and educational phase directed to all men of good will in the general public, to be carried on with active support of a large number of citizens' organizations and religious groups, national and international. This will be supplemented by a fund-raising effort by some of these same organizations, to provide larger means for immediate action, and a research and action phase to finance and carry out positive programs in needy countries to fill gaps in their agricultural development programs. The paradox of the coexistence of towering surpluses and hungry people is of course

[22] Maxwell Graduate School of Citizenship and Public Affairs, Syracuse University, "The Operational Aspects of U.S. Foreign Policy," 8th Congress, 1st Sess., Senate Comm. on Foreign Relations, Comm. Print, Study No. 6, Nov. 11, 1959.

one of the subjects to be considered in the discussions. A special background paper for the Campaign will be prepared on food distribution problems, with particular emphasis on surpluses and their use. You will hear much of the Freedom from Hunger Campaign in the period ahead; and I hope many of you will participate actively in it.

In conclusion, with the needs for economic assistance in underdeveloped countries, and their growing willingness to use agricultural surpluses and to adjust their development plans to them, active interest in the use of surpluses seems likely to continue. The conditions which led to the availability of surpluses for disposal on special terms also seem likely to continue for some time ahead. So long as surpluses are thus available, their use in helping to finance economic development can be an important contribution to the more rapid economic development of underdeveloped countries, except for any countervailing influence on retarding their agricultural development.

As professional agricultural economists, national or international, we members of the American Farm Economics Association should do our share to study this new tool of international economic cooperation. We need to determine how it actually works in practice in the countries involved and measure more closely what the effects are on their general economic development. We need to study the effects on farmers and other elements of the society in recipient countries, in competing exporting countries, and in donor countries; and to evolve and perfect the theoretical analysis as well as the operating facts. By making such studies as objective, realistic, and conclusive as possible, we may help to make this new instrument of international economic cooperation work as effectively as possible, and with the minimum of harmful side effects.

DISCUSSION: IMPACT AND IMPLICATIONS OF FOREIGN SURPLUS DISPOSAL ON DEVELOPED ECONOMIES AND FOREIGN COMPETITORS

MAX MYERS
Foreign Agricultural Service, USDA

The general subject under discussion this morning is even more important than we realize. It is closely related to the causes and possible remedies of major international tensions. It involves itself with agricultural policy, international trade and foreign policies, and world food problems.

Therefore, it is appropriate that competent professional men are giving consideration to the problems and possible improvements. The four papers presented this morning do contribute to our knowledge of the situation,

do help to define and evaluate problems and courses of action. I consider them to be excellent presentations for this time and place, and an improvement over previous sessions.

However, it is obvious that we have yet a long way to go in description and analysis of this subject. As the previous speakers have indicated, we lack factual information. As is obvious to the listeners, we change criteria in mid-analysis, and we generalize all too hastily. In professional humility let us call this a worthwhile preliminary discussion which should encourage more of us to do better.

These comments are my own and do not reflect, necessarily, the policies of the U.S. Department of Agriculture.

I have found it no easier than did the previous speakers to observe the division of the subject between "under-developed" and "developed" countries. I have found the papers to be so comprehensive that I cannot hope to comment in detail in these few minutes. For both reasons I shall put my comments in the form of a perspective without specific references to particular papers.

We are concerned here with a complex, dynamic subject which must be viewed in several aspects, including physical, economic, social, and political. A strictly economic analysis is difficult to make and of limited utility when made. I shall not try to do so. I shall try to view the overall situation as an agricultural economist who has operational responsibilities in this field.

In physical terms this world does not produce enough food and fiber for human needs. However, the deficit is relatively small, perhaps five percent on an approximate annual total of 1,700,000,000 tons. Nearly ninety percent of the food is grown quite close to where it is consumed. About ten percent enters into international trade. It now appears possible, but difficult, to increase production to provide adequate diets for the increasing world population, but to do so the major production increases must come in or near the deficit areas.

There are a few productive areas with more food than can be consumed locally or exported commercially. These supplies are mostly in the form of grains and in North America. The portion not now being used would not meet world needs, but could help to meet them, and increasing productivity in such areas can help to meet increasing needs. It is difficult to move these surpluses to needy populations, and any increases in such movements will come slowly and moderately.

These excess supplies constitute a very small portion of the world production, and a small part of the quantity internationally traded, but have a disproportionate influence in domestic and international economic and political affairs. They do exist and the probability that they will increase exists, just as in some other places hunger exists. Therefore, we

have, as some other nations have, various programs and devices to export more than we could sell for hard money at an acceptable price.

The United States Government is the largest dealer in this activity. The greater part of our surplus commodities are sold for local currencies. Only relatively small portions are given to other governments, or donated through charitable organizations, or bartered for minerals.

As indicated in the preceding presentations, criticism of the special programs has been frequent and varied. As mentioned also, the U.S. has been attentive to such criticism and has modified operations so that there now are few complaints from other nations.

Surplus disposal operations are related to domestic farm support programs in the United States, but I shall not comment on this in this statement.

Surplus disposals do return less dollars than their cost to U.S. taxpayers. They do return something in tangibles and something in intangibles. The alternative is to continue to hold the surpluses and to lose more in storage costs and in increased ill will abroad.

Surplus disposals, if improperly handled, can damage commercial markets for us and for our competitors. This has been recognized for some time and safeguards have been set up. Examples of supposed injury which are given usually relate to time periods two or more years past, and to the relatively small barter program. There exists some criticism in competitor countries based on wishful thinking of two types: (1) "We wish the U.S. surpluses didn't exist" or (2) "We wish the U.S. would make the recipient countries take all of our product for cash at high prices before signing any Public Law 480 agreements."

It has been charged that surplus disposals have injured the farmers of recipient countries. There seems to be little evidence of this, but it has been considered by the U.S. and recipient nations in negotiating agreements.

There have been a number of warnings about the "huge accumulations" of local currencies accruing from Public Law 480 Title I sales. This usually, and erroneously, is indicated to be a current, world-wide problem. Actually, it is more correct to say that it could be a future problem in five or six countries. During the past two years steps such as increased grants of currencies have been taken to prevent it becoming so. It merits continuing attention but not alarm.

Surplus disposals are related to economic development in the recipient countries. They can assist in economic development and serve as a means to stretch scarce foreign exchange. To say that the recipient governments would prefer dollars rather than grain, while probably true, is beside the point. The extra dollars are not likely to be appropriated while the grain incurs additional charges in U.S. bins.

Surplus disposal programs affect most of the foreign activities of the United States. The goal must be the overall best interests of the nation. Coordination necessarily is complex, time consuming and sometimes bitter, but it is carried out through a mechanism of inter-departmental committees, and a coordinator on the President's staff. Complaints about "lack of coordination" usually reflect a desire to have some one interest given absolute priority, or failure to understand the complexity of the administrative problems.

Criticisms such as the foregoing are useful and important, yet they are secondary. The primary aspects of this subject are in the realm of human desires and rather elemental economics.

Our people have made it evident that they want the surplus farm products put to use in parts of the world where people have inadequate diets.

People in the deficit areas for food and purchasing power are showing that they intend to get more.

Both groups probably would prefer to have these things done by rational, sound methods, but they intend to accomplish them in any event. They assume that many, at least, if not enough, economic resources exist or can be made to exist in the years ahead to be brought to bear on these problems. They expect the economists, the businessmen, the administrators and the politicians to work out the details.

This moving tide of intent can be sensed in many ways; for example, in the support for Food for Peace, in the interest in the Wheat Utilization Committee, in F.A.O.'s Freedom from Hunger Campaign. Actually a great deal is being done.

Some of the major implications are quite clear. There must be even greater, more effective food production effort as part of an economic development drive by the deficit countries. There must be more technical assistance and capital investment from the developed countries. The extra food and extra capacity in productive areas must be more fully used as a part in the overall effort.

This can be done in practical ways within a framework reasonably satisfactory to the interests and countries concerned, along the lines being followed and developed now. It can be done using for the most part existing institutions and commercial systems.

In order to do this effectively we do need more facts, we do need sharper analyses, we do need a better informed world citizenry. All these pose major tasks for agricultural economists, tempting tasks, including studies of programs which invite criticism. We should do more work, competent work, and where necessary indicate changes needed.

But as we make our analyses and evaluations let us remember that we are dealing with a great and moving effort which is not likely to turn back or stand still while we dissect it. Our economic, administrative and

political tools can be used to modify and guide it while it is in motion.

So we should continue, and increase and improve our work with an understanding and constructive approach. This is no time for little dreams or selfish schemes or inadequate economic analyses.

DISCUSSION: IMPACT OF SURPLUS DISPOSAL ON FOREIGN COMPETITORS AND THE INTERNATIONAL PERSPECTIVE ON SURPLUS DISPOSAL

R. L. KRISTJANSON
The Canadian Wheat Board[1]

Mr. Mortenson, in his paper on the competitors' perspective of foreign surplus disposal, has given an excellent summary of the problems created in competing countries by surplus disposal activities of countries such as the United States. If I have read his paper correctly he has said that foreign competitors feel that surplus disposal activities have a depressing effect on world prices, which he has substantiated with an example of dumping of cotton on world markets. He has made a plea on behalf of the competing nations for greater consultation between the United States and the competitors involved prior to the "hatching" of P.L. 480 transactions. He has singled out the barter programme for special mention as an undesirable programme. He has concluded by suggesting that the high level of price supports in the United States has been of major importance in creating the surplus problem and suggesting that attention be paid to the recommendation of the Haberler panel of experts that aid to underdeveloped countries should take the form of financial aid rather than being tied to specific commodity arrangements.

This has indeed been the competitors' perspective, but the competitors' perspective seems to be changing somewhat. In fairness to the competing nations, I think it should have been stated that there are many groups and individuals within these countries who know and appreciate that surplus food disposal has in fact made food available to the hungry peoples of the world—food which, in the absence of these programmes, would probably have been denied to them. And I do not think that either our economics or our commercial interests should become so important in our thinking that we lose sight of this important fact.

There is no question that competing nations fear and distrust many aspects of American surplus disposal programmes—and justifiably so. The diabolical scheme contained in Public Law 480, and commonly referred to as the barter programme, is, when stripped of its bureaucratic termi-

[1] The views expressed in this paper are not necessarily the views of The Canadian Wheat Board.

nology, nothing more or less than a dumping programme of the most vicious kind. If a country has a commodity to barter, this commodity could be sold at a price and the proceeds used to purchase surpluses. Going through the involved process of barter is simply a disguised means of price cutting which gains its strongest American support from commercial interests in the United States who benefit financially by these transactions.

On the other hand, programmes such as the one recently concluded between India and the United States for wheat cannot be seriously objected to by competing nations. This programme had several very desirable features. First, surplus wheat was made available to a country without the financial resources to buy wheat. India, with its per capita income of approximately $60 per year can hardly be considered seriously as a large commercial market. Second, there seemed to be a genuine need for the wheat. Both Indian Government estimates as well as the estimates of the Food-for-Peace Mission sent to India, indicated that the quantities of wheat involved were genuinely needed. Third, there was ample consultation. The Food-for-Peace Mission which was sent to India early in the year to assess India's food needs was comprised of representatives of the major wheat producing nations. Fourth, and perhaps most important, India is now assured of a known quantity of wheat for the next five years so that it can be counted on as an asset by the Indian Government in its desperate struggle to improve the standard of living for its people through its economic development programmes.

Turning now very briefly to Dr. Ezekiel's paper, one cannot help but compare the effects of his analysis on international food distribution problems to the effects of the Keynesian analysis on the unemployment situation in the 1930's. Many thinking people were saying early in the thirties that it was ridiculous to have people idle while there was such an obvious need for goods and public services. Economists kept saying that this was nonsense since the natural economic forces had caused the problem and it would in time correct itself. It was not until the Keynesian analysis appeared that the economics profession was provided with a theoretical rationale for coming to grips with the serious human problems created by the great depression.

Similarly, many thinking people have been saying for some time now that there is something basically wrong with an international food distribution system which necessitates the stockpiling of huge reserves of food in some parts of the world while millions live at a subsistence level. In 1954, in his novel and imaginative pilot study on the uses of surplus food for financing economic development projects in India, Dr. Ezekiel and his colleagues provided the basic idea for constructive action on this problem of international food distribution.

The basic idea of using surplus food as a partial substitute for capital in economic development projects, developed in Dr. Ezekiel's pilot study and summarized in his paper here today, leave many, many difficult and intricate problems unanswered. The effects of surplus disposal on the producers in the recipient countries, the problems connected with providing a balanced "market basket" of surplus food on a sustained basis, the possibility of maintaining a desirable balance between the amount of dollar aid and the amount of aid in the form of surplus food, and the effects of providing additional food to countries with a population problem that threatens its entire economic development program are just four of the many problems left unanswered. But because of Dr. Ezekiel's work we have the basic rationale for moving ahead. The problems are numerous but the possibilities are exciting.

THE UNITED STATES DEPARTMENT OF AGRICULTURE AS AN INSTRUMENT OF PUBLIC POLICY*

CHAIRMAN: J. P. CAVIN, AGRICULTURAL MARKETING SERVICE, USDA

THE McNARY-HAUGEN EPISODE AND THE TRIPLE-A

GILBERT C. FITE**
University of Oklahoma

THE DISCUSSION of agricultural policy has occupied the attention of agricultural economists intermittently ever since the founding of the American Farm Economic Association. Yet, despite the flood of articles, papers, and books on matters relating to farm policy, relatively little attention has been given to the United States Department of Agriculture as a policy-making agency. Here is a subject which deserves extensive historical and economic research, not only in the published records but in the department manuscripts deposited in the National Archives in Washington. It is obvious that this subject can be treated only in broadest outline in the few minutes allotted to me, even if the discussion is confined to the period of the 1920's and early 1930's.

In defining policy-making, I am referring to governmental or public policy. Moreover, only those major policies which were the center of attention in the 1920's, and up to the enactment of the first Agricultural Adjustment Act, will be considered. These include "equality for agriculture" or the parity concept; the idea of segregating surpluses to keep them from depressing the domestic market; adjustment of supply to demand, including acreage restriction; cooperative marketing as it blossomed under the Agricultural Marketing Act; and the concept that the federal government had a basic and fundamental responsibility to help farmers improve their income situation. By definition then, I am omitting any discussion of the Agriculture Department's policy-making role in such matters as tariffs, land policies, more efficient production, taxation, immigration, and so forth.

Public policies under the American system of representative government usually come from multiple sources. In some cases policy develops through the pressure of public opinion; sometimes it is the result of strong executive leadership; in other instances policy grows out of congressional action after months or years of consideration; and pressure

* Joint Session with the Agricultural History Society.

** Research for part of this paper which was done in the National Archives was sponsored by the University of Oklahoma Faculty Research Committee.

groups and lobbyists also cast their influence. Within an executive department of the federal government policy-making rests upon several important factors. The influence of the department depends upon the quality and aggressiveness of the secretary, the confidence which those whom he is supposed to represent have in him, and the backing upon which he can count from the President. In the case of the Department of Agriculture, success in policy-making may also be closely related to the competency and energy of the economists who must supply the data on which policy can be based.

Fortunately, during the period when surplus-control legislation in the form of the McNary-Haugen bill was being developed, the Department of Agriculture was in the hands of Henry C. Wallace. This Iowa farm publisher was vitally interested in the welfare of individual farmers and in agriculture as a whole. Moreover, he was not entirely bound by conservative and conventional economic thought. Wallace was also vitally interested in farm economics and maintained in his department a substantial number of outstanding agricultural economists in the persons of Henry C. Taylor, O. C. Stine, H. R. Tolley, and others. It would seem that after 1921 the Department of Agriculture was in an ideal position to make or influence policy. The Department was headed by a devoted, capable and popular secretary who maintained a staff of well-trained and hard-working economists. However, as will be shown later, the Department of Agriculture did not make a big impact on agricultural policy-making in the early 1920's because it assumed a narrow and rather traditional view of the Department's proper functions. By 1929, however, and especially after 1932, the Department greatly increased its influence as a policy-making agency.

The purpose for establishing the United States Department of Agriculture in 1862 was "to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants. . . ." The work of the Department during the late nineteenth century was concerned largely with research, sending out seeds, distribution of general agricultural information, and, in time, the assumption of numerous regulatory functions. By the twentieth century the Department was involved in conservation, road-building, agricultural education, and many other activities. The Department had been given extensive and varied responsibilities by World War I, but they were chiefly administrative rather than policy-making in character. The Department was essentially a service institution.

The farm depression following 1920 brought widespread demands for positive government action in the field of agricultural relief. However,

the Department of Agriculture was more often in the rear ranks than in the advanced guard when it came to working out policies which might help depressed farmers. The situation was much the same after 1920 as it had been before World War I when most of the farm relief proposals had originated outside the Department. The sub-treasury plan of the 1890's, the paternal ancestor of the storage and loan program adopted after 1933, originated with Harry Skinner, a North Carolina lawyer and politician. Export bounties were proposed by David Lubin, a Sacramento businessman and part-time fruit and wheat farmer. And Senator W. A. Peffer of Kansas made a strong plea before the Senate Agriculture Committee in 1894 for "an improved system of Government crop and market reporting. . . ."

After 1920 a flood of proposals to relieve agriculture hit Washington, and those which received most serious attention came from outside the Department. In 1921 Senator George W. Norris of Nebraska urged loans to provide foreign nations with money to buy American price-depressing surpluses. At about the same time two farm machine manufacturers who had found bankrupt farmers to be poor customers for plows developed a plan which they labeled "Equality for Agriculture." George N. Peek and Hugh S. Johnson proposed to raise farm prices on the domestic consumption of basic crops by making the tariff effective and obtaining a ratio-price, or parity. Their plan would not have achieved full parity, but it was aimed in that direction. The surplus was to be segregated and sold abroad at the world price and losses would be recouped by taxing each unit of a commodity sold. The Peek-Johnson plan was first introduced in Congress in January, 1924, and it held the center of the legislative stage until 1928.

At the same time there was a growing demand at the grass roots for the federal government to do something for agriculture beyond the traditional regulatory, tariff, and credit legislation. The Department of Agriculture was fully informed on the conditions among, and demands being made by, farmers. Hundreds of farmers wrote to Secretary Wallace describing their plight. One Montana farmer declared: "We farmers have done all we can ourselves. We are looking to Washington."[1] On August 29, 1921, Wallace sent a group of sample excerpts from farmer letters to President Harding because, he said, of "your earnest desire to do what is possible to build our agriculture on an enduring foundation, . . ."[2] In replying to farmers, however, Wallace mentioned only the usual means of helping agriculture such as more credit, better marketing methods,

[1] Quoted in Gilbert C. Fite, *George N. Peek and the Fight for Farm Parity* (Norman, Okla., 1954), p. 56.

[2] Wallace to Harding, August 29, 1921. Secretary's file, U.S. Dept. Agr. Natl. Archives.

lower transportation rates, improved statistical information, and studies of cost of production. In October, 1923, the Secretary sent Henry C. Taylor into the distressed northwestern wheat region to make a personal evaluation of the situation. Taylor reported that the Peek-Johnson plan "is the only method thus far proposed which would quickly re-establish the pre-war ratio between the prices of farm products and other products."[3]

Despite the seeming need for government action and the demands coming from the grass roots, Department officials acted cautiously. The correspondence and memoranda in the files of the Secretary for 1921 and 1922 indicate that Wallace, economist Henry C. Taylor and other leaders still considered the Department of Agriculture strictly as a service and advisory agency. The Chief of the Animal Husbandry Division wrote to Secretary Wallace on March 17, 1921: "I think we should emphasize the fact that the Department is an agricultural service institution, using the word 'service' in the broadest sense. . . ."[4]

Shortly after Wallace became Secretary, he asked a number of experts, both within and outside the Department, to discuss the field of agricultural economics. In this mimeographed booklet put out in 1921 there are articles by H. C. Taylor, L. C. Gray, O. C. Stine, O. E. Baker, B. H. Hibbard and others. None of these writers said anything about developing policy. Chester Morrill, Assistant to the Secretary, wrote that "legislation must be preceded by research and study. . . . Research work of the Department of Agriculture has been exceedingly useful to congress in formulating national agricultural legislation, as well as to the officials of the Department in administering them."[5] The Department's chief function then was to supply data; to collect and disperse information. This information was to be essentially of two kinds. One type could be used by Congress in making public policy, and the other was data designed to help farmers make more intelligent individual policy decisions. The Department, in other words, was to be basically an information center.

There was a great deal of discussion within the Department in the early 1920's about a national agricultural policy, but just what this should be and who should implement it remained vague so far as departmental officials were concerned. As Professor James H. Shideler has pointed out in his book *Farm Crisis, 1919-1923*, Secretary Wallace "entertained ambitions for the drafting of a complete national agricultural program and expressed an impatient intention to 'at once get at this matter of laying

[3] Fite, *George N. Peek . . .*, p. 56.

[4] Chief, Animal Husbandry Division, to Wallace, March 17, 1921. Secretary's file, Internal Reorganization.

[5] Henry C. Wallace, "Field of Agricultural Economics" (Washington, 1921). Mime. Booklet.

out an agricultural policy.'" However, as the complexity of developing comprehensive agricultural policy impressed itself upon the Secretary, he gave less emphasis to such an objective.[6] There were only occasional demands that Department officials attempt to sell any particular policy to Congress or to the nation. Leon M. Estabrook of the Bureau of Markets went about as far as any responsible official in the Department when he wrote to Wallace on March 30, 1921: "I think it is clearly a function of the Department of Agriculture to examine carefully all proposed legislation in its bearing on agriculture and be prepared to express a definite opinion as to its probable advantages and disadvantages to farmers and others, and to give specific reason as to what, if any, modifications are desirable. If in the judgment of Department officials certain proposed legislation will prove beneficial to the public if enacted into law and yet it has the appearance of class legislation, I think the Department should join in a campaign of education so that the public generally will appreciate its real purpose and true significance."[7]

Perhaps it is not surprising that the Department of Agriculture was slow in arriving at the conclusion that it might, and perhaps should, be an effective policy-maker. Prior to the establishment of the Bureau of Agricultural Economics in July of 1922, there was no central division within the Department which devoted itself largely to studying broad agricultural policy matters. There was simply a lack of manpower. If policy were to be developed it would in all likelihood come from the economists. But even here, where we might expect the advanced guard of policy proposals, the BAE for many years held to the position that it was a "fact-finding, information-giving, service-rendering institution."[8] In the early 1920's, the Bureau kept thinking in terms of individual farm adjustment aided by Department advice. Taylor, the Bureau's first chief, wrote on March 29, 1921, before the new division was actually created, that "through up-to-date studies of the world's production and demand, interpreted in the light of the history of agriculture and prices, the Department should be able, with adequate funds and the right personnel to keep before the farmer that information regarding prices which will, in the light of a knowledge of costs, give the bases for adjusting production to market conditions so far as this is subject to human control."[9] Long-range adjustment on a voluntary basis to bring production more nearly into line with demand also represented the views of Secretary Wallace.

---

[6] James H. Shideler, *Farm Crisis, 1919–1923* (Berkeley, Calif., 1957), p. 124.
[7] Estabrook to Wallace, March 30, 1921. Secretary's file, Policy.
[8] Henry C. and Anne Dewees Taylor, *The Story of Agricultural Economics in the United States, 1840–1932* (Ames, Iowa, 1952), p. 634.
[9] Taylor to Wallace, March 29, 1921. Secretary's file, Policy.

This briefly describes the situation within the Department of Agriculture at the time the McNary-Haugen plan of farm relief came up for serious consideration. Despite the apparent aloofness of the Department in the field of policy matters, it undoubtedly had more influence than may have been indicated on the surface. In the first place, departmental officials supplied statistical data and information on which ratio prices might be determined. Moreover, by 1923 both Henry C. Taylor and Secretary Wallace had given their blessing to the principle of "equality for agriculture." In his 1923 *Report,* Secretary Wallace wrote that "conditions during the past year throughout the country have tended to increase the demands made upon the Department of Agriculture for facts and figures which help to interpret the constantly changing situation. . . ."[10] Beginning in 1922, Peek had made a special effort to win departmental support to his plans, recognizing that the backing of a popular Secretary of Agriculture would be a major victory along the road to legislative enactment.

Most important, perhaps, was the fact that Peek and Johnson turned to economists in the Department to put their principles into legislative form. Charles J. Brand, a consulting specialist in marketing, worked out a draft which was later modified and introduced as the first McNary-Haugen bill. It should not be overlooked also that members of the Department were furnishing information to leaders on Capitol Hill out of which policy could be developed. Brand wrote to Peek on March 18, 1924, that he was supplying material to several congressmen and senators.[11]

However, up to this point, the Department of Agriculture might be viewed as giving a friendly assist to fundamental farm policy rather than being active and influential in policy making *per se.* This continued to be the situation until Henry C. Wallace's untimely death in the fall of 1924.

The passing of Wallace removed from the secretaryship a man who was not afraid to try new ideas. He wrote in May 1924 that the time had come to make a determined effort to improve agriculture "even if this effort involves doing some things which a few years ago we might not have been disposed to do."[12] If Henry C. Wallace had lived and could have obtained some administrative backing it is very likely that he would have turned the Department in the direction of fundamental policy-making. He was in basic agreement with those who recognized that American agriculture was confronted with problems which traditional ideas and approaches could not solve. Moreover, he saw the federal government as the instrumentality to develop new policies and programs. Also there was support for more vigorous departmental leadership in the field of farm

[10] *Yearbook of Agriculture,* 1923, p. 29.
[11] Brand to Peek, March 18, 1924. Peek Papers.
[12] Wallace to Dan A. Wallace, May 16, 1924. Secretary's file.

policy. Commenting on William M. Jardine's appointment as Secretary, the *Progressive Farmer* declared that the time had come when farmers wanted something more than leadership in experiments and research. They were looking for leadership, said the editor, in solving the great economic problems of agriculture.[13]

But the new Secretary of Agriculture, Jardine, did not conceive of his office in that light. He simply repeated that the Department's function was to furnish farmers with information which would help to guide them in their production programs. Furthermore, he believed that the Department could aid farmers by encouraging cooperative marketing as a means of giving producers a greater degree of control over their prices. With the support of Jardine and Coolidge, Congress created a special Division of Cooperative Marketing within the Department in July, 1926. Jardine's main help for agriculture was built around cooperatives which, as he said in his annual report of 1928, would "reduce costs and risks in marketing." He talked about adjusting production to demand but always in terms of voluntary action by individual farmers, or possibly through cooperatives. He told the Illinois Agricultural Association in January, 1926, that "a substantial part of the farmer's problems must be solved on the farm." In other words, just at the time Henry C. Wallace was coming to accept new and experimental measures for solving basic farm problems, he was succeeded by a Secretary who insisted on economic traditionalism with a vengeance. Jardine took the position that he would oppose any wild-eyed schemes like the McNary-Haugen or Export Debenture plans. His influence on policy was essentially negative.

The emphasis upon cooperative marketing by Jardine, Coolidge, and especially Hoover, finally resulted in passage of the Agricultural Marketing Act in June, 1929. But it is significant that the Department of Agriculture was not given the task of administering the new program. Rather, it was turned over to the Federal Farm Board. This was due no doubt partly to the long discussion of some kind of farm board by the McNary-Haugenites, but it also reflected a basic consideration about the Department: most people still viewed it largely as a fact-finding and service agency and not as an organization to make or execute broad national agricultural policy. Secretary Hyde explained in the summer of 1929 that "the fundamental functions of the department are research—the finding of the elemental facts and laws of biology and of economics regarding all branches of agriculture and its activities—and dissemination of the knowledge of those facts and laws to those engaged in agriculture."[14] This, then, was to be the major role of the Department, while the Farm Board strug-

[13] *Progressive Farmer*, Texas ed., XL (March 21, 1925), p. 324.

[14] Arthur M. Hyde, Speech at the Annual Farm Dinner, August 28, 1929, at Syracuse, New York.

gled with surplus and price problems.

Some of the economists in the Department were restless under the narrow and conventional lines of activity permitted by Secretaries Jardine and Hyde. They felt that the Department had more responsibility than to do research and issue statistical reports. From time to time after 1929 attempts were made to nudge Secretary Hyde into action. On April 23, 1930, for example, Nils Olsen wrote a memorandum to Hyde saying: "at our last luncheon hour you expressed an interest in the domestic allotment plan and the moves under way among grain people in the Northwest to build up support for this plan."[15] Olsen included considerable material on the allotment scheme which was then beginning to gain serious consideration. About a year later, O. E. Baker, senior agricultural economist, wrote Eric Englund that he felt the Bureau of Agricultural Economics was neglecting a duty and opportunity in failing to assemble "in convenient form and interpret in an organized manner significant data bearing on the agricultural situation." But Baker failed to go all the way in trying to push the Department into a policy-making position. He concluded his memorandum by saying that, except for land utilization—something, incidentally, in which Secretary Hyde had become much interested, "definite statements of policy should be avoided."[16] Baker was still thinking in terms of supplying data to Congress and state legislatures. Of course, furnishing data was vitally important as a basis for policy-making. But the crux of the matter was whether the Department would push for the adoption of definite policies on the basis of its own data and investigations of economic problems. It was unwilling to do so as late as 1931. Part of this reluctance to be more aggressive and bold in suggesting new policies was no doubt due to the widely recognized fact that President Hoover would not stand for what he considered some of the economic nonsense then under discussion. This included such ideas as parity prices, production control, and direct payments to farmers to help correct the economic unbalance. Thus any of the Department economists who were thinking about new plans and policies for agriculture were stymied by a hard crust of economic conservatism in both the departmental and national administrations.

Even before the Farm Board debacle, Secretary Hyde had been convinced that it was absolutely necessary for farmers to reduce their output if they hoped to receive remunerative prices. In November, 1929, he declared that "surpluses can best be handled before they are produced." Hyde's public speeches were largely devoted to voluntary acreage reduction in 1930 and 1931, and his files show that he wrote hundreds of farmers, and others, urging the same course of action. But he vigorously

[15] Olsen to Hyde, April 23, 1930. Secretary's files, Farm relief.
[16] Baker to Englund, May 22, 1932. BAE files.

opposed any schemes of forced reduction. He wrote on March 9, 1931: "I do not believe it is practicable either to force reduction or to induce it by a system of bonus payments."[17] Later in the year he admitted to Senator Arthur H. Vandenberg that forced cooperation among farmers to limit production was possible, but, he said, what would happen "to all our theories and principles of government . . . when we have got to the point of telling a farmer that he shall not cultivate more than fifty percent of his land?"[18]

Meanwhile, the American people had called for new national leadership which brought important changes in the Department of Agriculture. The new Secretary, Henry A. Wallace, had some firm opinions on what needed to be done to restore agriculture, and he was convinced that the federal government, more specifically his department, must plan and execute the necessary policies. Wallace had long been committed to the principle of parity prices made popular by the McNary-Haugenites. He favored some kind of acreage or production control, and he believed in direct benefit payments to farmers. Wallace had been a member of that small group which pushed consideration of the Domestic Allotment plan promoted by the untiring and persistent M. L. Wilson. In other words, Wallace believed in a definite set of economic principles—at least he was willing to experiment with them—and he viewed the Department of Agriculture as the agency which should implement and administer these policies. Of utmost importance was the support which Wallace had from the new President, Franklin D. Roosevelt.

Although the principles incorporated in the Agricultural Adjustment Act were well worked out before Henry A. Wallace assumed the secretaryship, it was Wallace and his staff which really put the ideas together in legislative form and pushed the bill through Congress. Once the new administration was in power, Wallace did not sit around waiting to be called by congressional committees merely to give advice on measures drawn by legislators or the national farm organizations. On March 10, Wallace called representatives of the major farm organizations to a meeting over which he and Assistant Secretary Rexford G. Tugwell presided. Wallace made it clear what he thought must be done. Already Frederick Lee, an old McNary-Haugen supporter, had been employed as a special counsel to draft a bill including the principles finally incorporated in the AAA.[19] The farm organization leaders agreed to go along with the new program, except for John A. Simpson, president of the Farmers Union,

[17] Hyde to C. E. McCartney, March 9, 1931. Secretary's files, Farm relief.
[18] Hyde to Vandenberg. Secretary's files, Farm relief.
[19] *Agricultural Emergency Act to Increase Farm Purchasing Power*, Hearings before the Committee on Agriculture and Forestry on H.R. 3835, 73 Cong., 1 sess., p. 7ff. See also Mordecai Ezekiel to Clifford V. Gregory, March 7, 1933. Secretary's Correspondence.

and leaders of the Farm Holiday Association. It was apparent that the Department of Agriculture was in command of the situation. Department officials probably could not have wielded such influence if farm conditions had not been so desperate. But extreme hardship out on the farm created strong pressure at the grass roots for quick action. This reduced the differences among the major farm organizations and at the same time lessened the opposition of extreme conservatives in Congress.

Charges that the Administration had forced the farm organizations to get on the bandwagon, and that the legislation was being ramrodded through Congress, brought President Edward O'Neal of the American Farm Bureau Federation to the Department's defense. In a radio address on March 23, 1933, O'Neal explained that the bill as passed by the House had farm organization support, although he did not try to cover up the part played by Wallace and the Department. When asked in a Senate Agriculture Committee hearing if the farm bill had the approval of the farm organizations, Wallace said they had accepted the principles involved. But, he added, he did not know how well the farm organizations were pleased with the actual measure before Congress. The implication was that the departmental bill would be pushed through regardless of those who were accustomed to playing an important part in policy matters.[20] At the hearings on the bill, Wallace was in charge of the situation. With Lee on one side and his special economist, Mordecai Ezekiel, on the other, the Secretary was sure and positive of his position. His ace in the hole was strong backing from the White House.

Moreover, Wallace was able to defeat what he considered undesirable provisions supported by some farm leaders and congressmen. Especially strong support developed to include John Simpson's cost-of-production amendment, but the Secretary parried and killed this demand with utmost tact and skill. Senator Cotton Ed Smith wanted to confine the benefits of the measure to only wheat and cotton, but this was also defeated. Opponents of the New Deal farm bill, perhaps unwittingly, paid tribute to the Department's effectiveness when they attacked the measure in debate. For example, Congressman Charles A. Eaton of New Jersey said the bill had been written by three great agriculturalists from Manhattan Island—Ezekiel, Tugwell, and Morgenthau.[21] Passage of the AAA, with the extensive powers given to the Secretary, left no doubt about the influence of Wallace and the Department of Agriculture. Backed by the President, and drawing support from masses of farmers, the Department had at last become a major determiner and administrator of broad public policy.

[20] *Agricultural Emergency Act to Increase Farm Purchasing Power,* Hearings, p. 7-10.

[21] *Cong. Rec.,* 73 Cong., 1 sess., March 21, 1931, pp. 694-700.

THE U. S. DEPARTMENT OF AGRICULTURE AS AN INSTRUMENT OF PUBLIC POLICY: IN RETROSPECT AND IN PROSPECT

BUSHROD W. ALLIN*
Agricultural Marketing Service, USDA

PUBLIC policy is Government policy, which is hammered out in harmony and in conflict by the legislative, executive, and judicial branches of Government. It includes the policy of the Federal Government. The policy or purpose of that government is developed under the American political system we call in a broad sense *democratic,* but *republican* if we look at it as a federation of States with powers shared between the States and the Federal Government.

The instruments employed for administering and helping make Federal policy are the various departments of government, together with numerous commissions, boards, and regulatory bodies. Each of them is an instrument of economic and political power, just as a tractor is an instrument of physical power. Also, like the tractor, each of the parts has a history of change in response to new ideas and changing conditions.

Few of these instruments of Federal power are more important than the Department of Agriculture. This Department is not merely a building on Independence Avenue in Washington that is second only in size to the Pentagon. It is something much more significant, even if less tangible. It consists principally of the impact its activity has on the daily transactions of farm people—transactions affecting agricultural production, prices, farm incomes, and the Nation's whole economy. This impact on current transactions takes place under a complex, changing system of working rules created by collective action to provide the limits and opportunities within which the individual farmer makes his farm management decisions. I am referring now to the rules that are administered largely within the Department of Agriculture in carrying out conservation, adjustment, marketing, credit and other programs; and to the research and educational programs which provide the basic information for government programs and farm decisions. They are continually changing in an attempt to fit actions of the National Government in the agricultural field to the changing public will.

The Agricultural-Business Conflict

As I see it, today's controversial activities of the Department constitute primarily the current phase of the continuing process of resolving the agricultural-business conflict in the public interest. "Adjustment" is the

* The author wishes to acknowledge assistance in the preparation of this paper from two of his colleagues in the Department, Gladys Baker and Wayne Rasmussen.

most widely used name for it. This process began with the founding of our Federal Government and will continue on into the indefinite future.

If you would understand the current actions of the Department, it is necessary to know at least something of the conditions and circumstances out of which they developed. Knowledge of what has gone before is essential to help guide us toward reliable opinions as to what the future holds or should hold. "The past is prologue."

In the context of the agricultural-business conflict, I divide the history of our Federal Government first into two periods: (1) the 73-year period before the Department of Agriculture, from 1789 to 1862, and (2) the 98-year period after the Department, from 1862 to the present.

Our Federal Government originated as the outcome of a struggle for freedom from British rule when we were predominantly a farm people.

> "By the rude bridge that arched the flood
> Here the embattled farmers stood;
> With flags to April's breeze unfurled,
> And fired the shot heard round the world."

We revolted in 1776—the same year Adam Smith wrote his *Wealth of Nations,* giving the rationale for opposing mercantilism and landlord feudalism; and for substituting in their place individual freedom, business capitalism, and free world trade. Most of us accepted Smith's doctrine, as it applied both to minimizing the powers of government (laissez-faire) and to fostering free world trade.

But we had not been a nation very long until our growing business interests began to ask our government to impose protective tariffs against imported British and other foreign manufactures. Then, as now, our farmers were not all the same kind of farmers with the same kind of problems. The most powerful and "commercial" type then was the southern planatation owner-operator who operated with slave labor and produced tobacco and cotton for export—mainly to Britain. He was for free trade and he knew why. He was selling his principal cash crops on a world market and he wanted to buy what he needed from the same market rather than pay higher tariff-protected prices for domestically produced manufactured items. He wanted to do this because it gave him more for his money.

Another type of farmer, to be found throughout the country, was the "family" farmer—or Jefferson's ideal—which means smaller farms on which the owner and his family did most of the work and produced most of their output for home use rather than for sale.

In the halls of our earliest government, growing business interests (especially in the North and East) exerted increasing pressure for a protective tariff for their infant industries. In the campaign of 1828, Henry Clay, the "Great Compromiser" went about the country trying to recon-

cile the conflicting interests of agriculture and business on this issue. He said that all patriotic Americans wanted their new country to develop into a world power rather than remain indefinitely an agricultural colony of Great Britain. This argument he used with some effect on all types of farmers; but to the family farmers in the North and East who were not producing primarily for export, and who felt the need for a larger home market for their surpluses, he promised that his protective tariff policy would give them such a market. That is one promise that was kept. In 1960, more than seven-eighths of our population constitute the domestic market for the products of our farms. And yet, despite this fact, the farmer is still complaining about the prices he gets and pays in that market.

In 1828 we enacted the Tariff of Abominations. In the meantime, the slavery issue was warming up. By the time another quarter century was to pass we were to engage in a bloody civil war which was not only to resolve the slavery issue, but for many years to come, the tariff issue as well. With that war the dominant control of our Federal Government passed from plantation agriculture to business.

During that war, however, President Lincoln signed three bills to promote family farming: (1) The Homestead Act, giving free land to homesteaders, (2) the Land Grant College Act, providing a college in every State to teach agriculture and mechanic arts to farmers' sons, and (3) the bill creating the U. S. Department of Agriculture.

There are three principal reasons it took 73 years to establish a Department of Agriculture.

The first of these is that the Nation during its earliest existence was so overwhelmingly agricultural that there was no clearly recognized need for a Department to look after the special interests of farmers. According to the first census in 1790, about seven-eighths of our people lived on farms; by 1860 the proportion had been reduced to about two-thirds, and it now stands at less than one-eighth. Moreover, a larger proportion of our farmers in 1790 and 1860 than now was producing primarily for home consumption rather than for sale.

A second reason it took so long to establish a Department of Agriculture was the Federal-States relations issue, the modern manifestations of which can be seen in the present organization chart of the Department. The agricultural founding fathers, including Jefferson and his followers, wanted an expanding agriculture with a minimum of "interference" from a central government. With what then appeared to be a virtually limitless expanse of unsettled farmland to the West, a proliferation of family farms was not only desirable for political and economic reasons, but it was also distinctly feasible on what was for all practical purposes free land.

There was a general disposition to restrict the powers of the central government to "exterior" functions such as foreign relations, defense, and the raising of funds for these purposes, and to reserve "interior" or domestic functions to the States. Hence, our first Federal Departments were State, War, and Treasury. Not until 1849 did we add the Interior Department to deal with domestic matters that inevitably intruded themselves. Until then domestic functions were assigned willy nilly to the basic three Departments.

A third reason for the late appearance of the Department of Agriculture was the philosophy of government held by the founding fathers. That philosophy in the earliest years even questioned the wisdom of political parties; and it effectively opposed, until the establishment of the Department of Agriculture in 1862, the representation of special interests in the government structure, even when such interests were also general or public interests. Thus, the creation of the Department of the Interior was the creation of another general interest department without reference to economic or occupational groups.

As early as 1796, however, George Washington had recommended the establishment of a Federal Board of Agriculture, but nothing came of this proposal. Both Franklin and Jefferson, while representing this country abroad as members of the State Department had sent seeds of unusual or improved plants back to the United States. On March 26, 1819, the Secretary of the Treasury asked all consuls abroad to procure useful seeds and plants. A similar circular was sent out by a later Secretary of the Treasury on Septembr 6, 1827, at the suggestion of President John Quincy Adams.

In 1836, Henry L. Ellsworth, Commissioner of the Patent Office, which was then in the Department of State, undertook to distribute new and valuable seeds and plants to farmers. Ellsworth was interested in improving agriculture and in promoting settlement in the western lands. He owned and had for sale large tracts of land from Indiana to Michigan. Three years later Congress appropriated $1,000 of Patent Office fees for collecting agricultural statistics, conducting agricultural investigations, and distributing seeds. By 1854, the Agricultural Division of the U. S. Patent Office, then a part of the Department of the Interior, employed a chemist, a botanist, and an entomologist, and conducted experiments.

It was out of this gestation period that the Department of Agriculture was born in the midst of a civil war—a birth made possible by the withdrawal of southern Senators and Congressmen which permitted Lincoln to carry out his pledges for agrarian reform made in 1860. The creation of the Department, in my opinion, was the creation of a salutary precedent in American government. It recognized the practical necessity for a democratic government to incorporate in its structure what I call "special

interest" departments, or centers of special concern for major economic interest groups.

The principal opposition to the creation of the Department turned on precisely this point: Why not then have a Department of Labor, and a Department of Commerce?

Well, we now have such Departments. A Bureau of Labor was created in 1884 as part of the Department of the Interior to collect statistics. In 1903 a Department of Commerce and Labor was created; and in 1913, these conflicting interests were divided into two separate Departments. To cap the climax, our last Department to be added to the list is the Department of Health, Education and Welfare—a type of Department not once contemplated by the founding fathers. This Department deals with the special interests of the sick, the teachers, the students, the aged, the poor, and the unemployed.

The first 58 years of the Department of Agriculture's history, from 1862 to 1920, I call its period of economic orthodoxy. The next 12 years, from 1920 to 1932, I call its period of temptation and indecision. The years since 1932 I call its period of economic and political power. We could subdivide and label the parts of this last period, but better judgment may tell us to wait a decade before doing so.

The Department's Period of Economic Orthodoxy

The bill creating the Department was a compromise between the demands for an organization with Cabinet authority and those calling for a subordinate authority within the Department of the Interior. The law described its functions to be "to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of the word. . . ." This was the principal purpose of the United States Agricultural Society, the organization primarily responsible for the passage of the Act. None of the members of this organization contemplated then the kind of activities the Department was ultimately to undertake with respect to farm prices and incomes.

The opposition, however, had well-founded fears. An information service could easily be the entering wedge for other functions. It might even provide facts about bargaining power with which farmers could beat business over the head politically. But business was to be spared this treatment for 58 years, even though the farmers became quite unorthodox both economically and politically. The Department remained on noncontroversial ground because its information during this period was primarily production rather than "parity" information. In the long downward slide of farm prices from 1866 to 1896, however, agrarian revolt was to set the stage for agricultural institutions that were to be a major force

in making American agriculture the world's production marvel.

It was all started innocently enough by a clerk in the newly created Department of Agriculture by the name of Oliver Hudson Kelley. His purpose was merely to found a social order patterned after the fraternal order of which he was a member—the Masons. But the farmers had no intention of thus restricting the functions of the Grange which he founded. They made it a crusade against the "money changers," monopoly and special privilege—a movement that was to culminate in the Populist Party. Voices in the wilderness like those of "Yellin'" Mary Lease could declare that farmers should "raise more hell and less corn," but the farmers took only the first part of that advice. They believed in free competition and free enterprise, and saw their problem as the "machinations of Wall Street." Incidentally, they proceeded to strengthen the Department of Agriculture in its authorized and orthodox functions.

In 1887 the grangers took a new look at the Land Grant College System-then 25 years old. They concluded that it had not been very effective in doing what they intended it should—namely, make better farmers and mechanics of their sons. It had been staffed by scientists—chemists, biologists, geneticists, etc.—who were primarily engaged in training more scientists. What they taught was of little practical use on the farm because it was rooted mainly in theory rather than practical research on field plots representing the variety of climates and soils in the various States. To correct this defect they passed the Hatch Act, adding to each Land Grant College an Experiment Station. They then began to get practical results that could be taught to students who in turn could apply them on the farms.

Another "granger law" in 1889 gave the Secretary of Agriculture Cabinet status. Business opposition to the law was based on the claim that it would give farmers political power and put the Department into politics.[1] And it did, in fact, do both of these things.

The core of Federal agricultural policy prior to World War I, as represented by the activities of the Department of Agriculture-Land Grant College System, was to "make two blades of grass grow where one grew before"—in other words, it was predominantly a policy of improving agricultural productivity or output per man hour.

Since the addition of the Experiment Stations to the Land Grant College System, the demand had grown among farm leaders to make the results of research available to adult farmers as well as to resident stu-

[1] "I make the prophecy here and now that if this bill is enacted into a law, if this position is elevated to a Cabinet position, it will become a political engine rather than a department of the Government intended to promote the interests of agriculture." (Speech by Mr. Covert, Chairman of the House Committee on Agriculture, and a lawyer from New York State—page 1318, *Congressional Record*—House, Feb. 7, 1881).

dents on the campuses. In 1914, Congress passed the Smith-Lever Act creating the Federal-State Cooperative Extension Service, thus completing the third leg of the triumvirate—resident teaching, research, and adult instruction in agricultural production methods. Today, each of the 3,000 agricultural counties of the United States has a County Agricultural Agent, and many have more than one—most of them also have Home Economics Agents.

With the outbreak of World War I, prices of farm products began to rise. By 1917, the year we entered the war, the ratio between prices farmers received and those they paid had risen to 20 percent above the 1910-14 average. Farmers were prosperous and their land values began to soar. Many thought we had entered a "new era" that would last indefinitely, but they were soon to be sorely disappointed. In a single year, from 1920 to 1921, farm prices fell 50 percent. By 1921 the purchasing power of farm products had fallen from a wartime peak of 120 percent of the 1910-14 level to 80 percent. Farmers got mad. They said it was not fair.

The Department's Period of Temptation and Indecision

Out of this anger there emerged during the twenties an agri-business farm leadership for the McNary-Haugen Bill, a new farm organization, and the Federal Farm Board.

When farm prices collapsed between 1920 and 1921, the elder Wallace, then Secretary of Agriculture, attempted to use the Department as an instrument for dealing with the problem. Business opposition was centered in the Department of Commerce and the Treasury. Wallace's principal accomplishment was that of expanding the agricultural economic information services and inaugurating an agricultural outlook service under Henry C. Taylor, his chief of the newly created Bureau of Agricultural Economics.

Meanwhile, the dynamic leadership of the farm relief movement was assumed by two farm machinery manufacturers, George Peek and Hugh Johnson, whose company was in financial difficulties because of low farm prices. They led the farmers against the hard core of business in the McNary-Haugen fight. At the same time, the American Farm Bureau Federation had emerged around and out of the Federal-State Extension Service. "Orderly marketing" was its central objective, but many of its strongest units backed Peek and Johnson.

Wallace used a member of his staff, Charles J. Brand, to help in drafting the first McNary-Haugen Bill, a document incorporating the Peek and Johnson principles of "equality for agriculture." The Bill provided that the Secretary of Agriculture would be chairman of the Board to be created for administering the program. Gone were the days when a clerk in the

Department could unwittingly start an agrarian political revolution. One was now being aided and abetted by the Secretary of Agriculture himself, as if in fulfillment of the business prophecy of 1881. Gone were the days when farmers were being led by the "sons of the wild jackasses"; they were now being lead by "agri-business" men under established protective tariff doctrine.

The outcome of the struggle was a compromise—The Federal Farm Board created under the Agricultural Marketing Act of 1929, with the Secretary of Agriculture as a member. Since Wallace's death in 1924, that office had been filled by more orthodox leaders. Coolidge had said, "This is a business country . . . and it wants a business government." Hoover appointed an "agribusinessman," a former Board Chairman of International Harvester (Alexander Legge), as Chairman of the Federal Farm Board; and transferred the staff of the Division of Cooperative Marketing of the Bureau of Agricultural Economics out of the Department to the newly created "independent" agency. Thus, the Department, against its earlier will, was being kept "out of politics," but this posture was not to last very long.

The Department's Period of Economic and Political Power

With the onset of the Great Depression, public confidence in business leadership fell to the vanishing point and ushered in the New Deal. Henry A. Wallace, the formerly crusading editor of *Wallace's Farmer* and son of the earlier Secretary Wallace, proceeded to lead the farmers into a national farm program of controlled production that had been condemned by its opposition as "economically unsound." Peek was called to Washington to administer the new farm program, and Johnson was asked to administer the National Industrial Recovery Act. But the political pendulum was swinging too far to suit the sensibilities of these agribusinessmen, and they did not last very long.[2] College professors and farmers who had embraced production control as a part of their philosophy took over. A nationwide farmer committee system was set up to administer the far-flung programs.

The Department was in controversy up to its ears, and reached a new high as a political force under Roosevelt. In terms of its economic role, it now stands at a new high, as measured by the lending authority of the

---

[2] "I went into the Roosevelt Administration because I saw a chance to do something for agriculture. I got out when I saw . . .

"The Administration has committed itself, by a distortion of the lately deceased Agricultural Adjustment Act, to a policy of socialized farming. It has committed itself, by a distortion of the Reciprocal Trade Agreements Act, to a low tariff policy which has all the worst features of that free trade which the nation has always turned down at the polls." (From *Why Quit Our Own*, by George N. Peek with Samuel Crowther, D. Van Nostrand Company, Inc., New York, 1936, p. 11).

Commodity Credit Corporation and the volume of Federal costs for price-support operations.

In the absence of effective controls, the bargaining power for producers of price-supported crops is being supplied by government through its power to withhold from the market supplies that cannot be sold at legislated fair prices. The farm program debate now centers around the level of price supports and the method of their administration, especially with respect to the degree of production control and the related level of costs to the taxpayer.

In Prospect

No one can review the history of the Department as an instrument of public policy without noting that it has primarily undertaken two broad tasks: (1) To improve the farmer's productivity, and (2) to strengthen his bargaining power. The principal instruments used for the first purpose have been the Federal-State system of Experiment Stations and Extension Services. These instruments have been and will continue to be most successful, partly because their activities involve a minimum of conflicting interests. Through various international technical assistance programs, their influence is becoming world-wide.

By definition, however, any effort to improve bargaining power is an effort *against* other interests, as recently illustrated by such instrumentalities as non-recourse loans and marketing orders. This is the area of controversy; and it will continue to be so as far into the future as anyone can see, however much the farmers may become confused along the way.

The administration of public programs to improve the farmers' bargaining power will continue to involve the Department of Agriculture simply because that has become an established responsibility of the Federal Government, as set forth in acts of the Congress and approved as constitutional by the Supreme Court. The Congress and the Supreme Court will provide the broad guidelines of policy, and the Department will continue to be influential in determining precisely what is to be administered.

In the last analysis, it is always the power of government that allocates rights and duties of individuals and groups with respect to bargaining power. For example, when the Supreme Court said the Maryland-Virginia Milk Producers Association could not continue to own Embassy Dairy, it said something of interest to the cooperative marketing movement; but there is no prospect that the Court will ever decree a "positive program of laissez-faire."

Meanwhile, those who prefer to call the farmers' bargaining power problem a "marketing efficiency" problem will continue to confuse the issues by featuring the opposite meaning of the term, namely, the problem of increasing efficiency in the *production* of marketing *services*. This is quite different from bargaining power, which is power to *withhold* for

a price—the power to influence supply, demand or both. Power to influence market supply includes such activities as those conducted under Public Law 480. Power to influence demand includes government efforts to promote "merchandising."

Today, many of our farmers say they want family farms, free prices and a minimum of government action. But they must try to achieve these goals under entirely different conditions from those which confronted Jefferson and his followers. They are faced with an over-expanded agriculture which is relatively much smaller than the rest of the economy. The land is not free; it is not only all owned, but is also high in price. Farmers are not now largely self-sufficient; they produce mainly for sale. These are the reasons why the Department performs functions today undreamed of by its founders. When less than 5 percent of our population are producing all our agricultural requirements, the epitaph of agrarian philosophy will simply read "It might *not* have been."

The possible effect such changes in voting proportions might have on the activities of the Department is by no means clear. A much larger proportion of our farmers will then be operating substantial business enterprises and they will have to think and act more like businessmen in order to survive. More of them will have a better understanding of the meaning of bargaining power, which should make it easier for them to organize effectively. Add their numbers to agribusiness, including the country bankers, and the aggregate should continue to be a formidable force.

Already, agricultural economics departments are training more and more students for agribusiness as compared with those for government, farm management and university service; and agricultural colleges are becoming "State universities." Will the Department of Agriculture become more and more exclusively concerned with the needs and problems of commercial agriculture and agribusiness as compared with those of farm labor and low-income farmers?

Only the future will answer this question, but the basic conflicts of interest involved have long been visible to the naked eye.

DISCUSSION: THE U. S. DEPARTMENT OF AGRICULTURE AS AN INSTRUMENT OF PUBLIC POLICY

RICHARD S. KIRKENDALL
University of Missouri

Doctor Allin and Doctor Fite have provided us with very useful and quite harmonious schemes for the organization of the history of the Department of Agriculture. The harmony is rather surprising for they developed out of the viewpoints of different disciplines. Although there are

a few conflicts in interpretation, the schemes fit together quite neatly. Part of the explanation, I believe, lies in the large influence upon Allin of John R. Commons, an economist with a historical orientation.

This harmony appears in such basic matters as the emphases upon change and upon group interaction and in such specific interpretations as the thesis that the Department reached new heights as a political power in the years of Henry A. Wallace. Another illustration is the dim view of Secretary Jardine. Our economist does not even bother to supply the name of the Kansas educator who became Coolidge's Secretary and Hoover's ally, dismissing him simply as "more orthodox" than his predecessor. The historian treats Mr. Jardine rather more harshly, charging that he did not conceive of his office as an instrument to solve "the great economic problems of agriculture," that he "insisted upon economic traditionalism with a vengeance," and that "his influence on policy was essentially negative."

Even though I'm reluctant to appear as Jardine's champion, I cannot endorse this interpretation. He rejected the McNary-Haugen proposals but did endorse another farm relief plan that had about as much possibility of solving "the great economic problems of agriculture." His call for cooperative marketing was a positive call for a fairly new device and one that many prominent businessmen by no means regarded as "economic traditionalism."

"Compromise" strikes me as an inadequate label to pin on the outcome of the struggle over farm relief in which Jardine was involved. Didn't the Agricultural Marketing Act actually represent a rather one-sided victory for Herbert Hoover, the period's leading advocate of "orderly marketing" and a cut in farm production? He was not one who considered controlled production "economic nonsense" or "economically unsound." Peek, the hero of the McNary-Haugen forces, was the great opponent of that means of raising farm prices. Henry A. Wallace, M. L. Wilson, Rex Tugwell, Mordecai Ezekiel, *et al.* became promoters of the idea with which Hoover had been most closely identified, although they rejected his ways of controlling output.

The second Wallace, in other words, broke with as well as built upon the McNary-Haugen movement. In doing this, he did not act quite so boldly in relation to the major farm groups as Fite suggests. The A.A.A. included much more than the production control idea which Wallace regarded as the most promising method of farm relief. The Act included much more, largely because the groups contributed to shaping it and lobbying for it and because they did not share his confidence in that method. Wallace always tried to work with the major farm organizations and hesitated to pursue policies that would alienate them. The famous "purge" in 1935 illustrated his methods dramatically.

This cooperation with the farm groups was one of the bases of depart-

mental power in the thirties. But in spite of Wallace's efforts to associate the groups with New Deal farm policy, discontent developed in the most powerful of them, the Farm Bureau. In order to reduce the power of the Department, the Farm Bureau began to urge that the extension service be given larger responsibilities for the administration of the farm programs. Allin remarks of the extension service that its "activities involve a minimum of conflicting interests." That minimum, however, has amounted to a very noticeable amount of conflict, conflict with various business and professional groups and certain farm organizations as well as the New Deal planning and "action" agencies. The Department's dealings with "extension" have affected power relations and thus have stimulated conflict among interest groups.

So far I have expressed but a few reservations about things that the speakers said. For a moment, let me object to something they did not say. They did not say enough about departmental efforts to promote long-run reforms in land-use practices. Here was a major interest of the Department, especially during the administrations of the two Wallaces and Arthur Hyde. Fite's decision to neglect this is understandable, for the farm relief movement has been the focus of his significant researches. (At times in this paper he seems to limit his definition of policy—at least "fundamental" or "broad" policy—so that the definition contains only vigorous governmental efforts to raise farm prices.) Allin's treatment of an area in which the Department has shaped policy and experienced frustrations is more difficult to explain. Land-use planning, after all, has been a major concern of his important career in the Department. No doubt it is painful to discuss one's frustrations in public, but some probing of these planning activities would have exposed a great deal of the strengths and, above all, the political weaknesses of the U. S. Department of Agriculture.

Finally, I wish to emphasize two features in the papers that interest me a great deal. I refer to their discussion of the roles of businessmen and presidents in farm politics. The economist's organizational scheme stresses conflict between business and agriculture, but as his paper moves along it points to much cooperation between the groups. If the story had been only one of conflict, the farmers would not have done as well as they have in the farm politics of the past forty years. This penetration into farm politics by the urban businessman has helped to compensate for the decline in the farm population. Here is a theme that has not yet received the systematic, scholarly treatment that it needs. One businessman in farm politics who deserves more attention is Henry Harriman, president of the U. S. Chamber of Commerce in the early years of the New Deal and an important supporter of production control who, unlike Peek, was able to remain on friendly terms with the Wallace regime. Businessmen like Peek and Harriman have been interested in the farmer as both an

economic and a political power and have hoped to get him to accept the world of big business and imitate its methods.

Turning to the President in farm politics, this is an important theme in the historian's paper but one that not even he emphasizes sufficiently in his efforts to explain the successes and failures of the Department as policy-maker. Roosevelt's support for Wallace receives adequate recognition. Not enough, however, is said of the lack of presidential backing for Henry C. Wallace, a factor that was at least as important as his point of view in limiting his accomplishments. He changed his view about the Department's obligations to seek farm relief, but Harding and Coolidge never supplied much help for his efforts to reform land-use practices and aid distressed farmers. The Voluntary Domestic Allotment plan, just like "Equality for Agriculture," originated outside the ranks of the departmental leaders. But the former plan, unlike the latter, became a program in part because it gained the presidential support that McNary-Haugen never achieved.

Not much policy can be made by a Secretary who lacks vigorous support from a man willing and able to use the great powers of the presidency. The Secretary of Agriculture faces an especially large task. He serves a remnant of the old America and expends much of his energy seeking to fit agriculture into the new America. Two features of modern life—science and big business—have been particularly influential in the activities of the Department. It has attempted to bring the techniques and results of science and big business into the world of the farmer. Consider, as evidence of this, the attempts to base land-use practices on the conclusions of research and to develop large-scale organization, the two-price system and production control. Producing changes like these is not an easy task in a political system such as ours in which people and organizations possess the power needed to resist change. Thus, in order to make policy, the Department often finds itself dependent upon the man at the peak of our political power structure.

It is in this context that I interpret Allin's organization of the past 27 years, an organization that he slips in apparently against his better judgment. The Department, he writes, "reached a new high as a political force under Roosevelt" while "in terms of its economic role, it now stands at a new high. . . ." When one recognizes that in the most recent period the U. S. Department of Agriculture has been a great economic power in spite of the desires of the Secretary, one can believe that Mr. Benson, with his friendly but quite ineffective relations with the President, wishes that a man of great political skill occupied the White House. The Secretary of Agriculture who moves to Washington with President Nixon or President Kennedy could benefit from the return of that kind of skill to 1600 Pennsylvania Avenue and push the Department to "a new high as a political

force." Such a development would add a new period to the schemes that have been presented to us. We may label it the second period of political power.

THE PAST IS PROLOGUE; WHAT ARE THE PROSPECTS?

ROSS B. TALBOT
Iowa State University

Professor Fite and Dr. Allin have provided us with papers that are interesting, informative, and often original. Probably we should ask for no more, but a discussant has to have a somewhat cussed nature or else his role is rather meaningless. There is in this academic process a sort of natural sequence of events: after the praise comes the gauntlet.

One real difficulty in trying to analyze the role of the United States Department of Agriculture in the development of national farm policy is the matter of multiple factors. If we look at public policy—both in terms of its formulation and administration—as a mosaic, the difficulty of the task becomes apparent almost immediately. We have to portray the surface decorations in such a manner that our artistry will provide an accurate conception of the working out of the different social, economic and political forces. Indeed, the task of the social scientist is additionally complex because the sub-surface ingredients may be of crucial importance.

Take the enactment of the first Agricultural Adjustment Act, for example. Clifford Gregory's account[1] of who hatched the policy egg differs from Professor Fite's in rather significant respects. Gregory certainly allots a more important role to the farm organizations. Russell Lord[2] and O. M. Kile[3] seem to be in fairly close agreement with Fite's account but there are differences in detail. Why is this so? Because the public policy process is more intricate, at least at this stage of human knowledge, than is the hatching process. (I admit that my colleagues may well comment at this point that I have just laid an egg!)

Albeit, let me just outline the political factors which were existent in 1933—a severe farm depression had existed for over a decade; there was a gradually changing stereotype (or picture, to use Lippmann's term) going on in the minds of many of the electorate as to the legitimate role of the national government in the area of public policy; presidential leadership

[1] Clifford V. Gregory, "The American Farm Bureau Federation and The AAA", *The Annals of the American Academy of Political and Social Science*, 179:152-58, May, 1953.

[2] Russell Lord, *The Wallaces of Iowa* (Boston: Houghton, Mifflin Co., 1947), Chapter X, Part 1.

[3] O. M. Kile, *The Farm Bureau Through Three Decades* (Baltimore: Waverly Press, 1948), Chapter XVI.

was dynamic, and it was warmly sympathetic to the farmer (and the same could be said for the new Secretary of Agriculture); the New Deal, as an idea, had begun to capture the hopes and dim the fears of a frightened people; the farmer's political strength in the committee rooms and the floor chambers of Congress was vigorous and substantial; there was a goodly amount of organizational unity between and within the farm organizations; the science of economics and public administration had progressed to the state where national planning was possible and eagerly anticipated, at least by certain economists and political scientists; technological improvements had been making it increasingly obvious that we had an economy of farm surpluses, domestically; and the Republican Supreme Court had not yet diminished the dream of a National farm policy with its resounding use of the power of judicial review. Out of all these factors, and no doubt several others, we have to discover an answer to the Lasswellian question—Who got what, when, and how?

It is clear to us that the USDA has been a potent instrument in the development and execution of public policy since 1933. We know also that when the combination of factors, or ingredients, is altered the USDA's role is modified. Wilcox and Hope[4] have shown, briefly but neatly, that the President, and his Secretary of Agriculture, can veto any policy they strongly dislike even if they cannot enact just the legislation they desire. Further, we can see that present ideological schisms between the farm groups make it difficult, if not impossible, for the Congressional farm committees to perform their traditional role of broker and compromiser. This condition creates a political environment in which—to use, in a rather different fashion, an analogy of Mr. Charles Shuman's[5]—there is at least one too many Holy Grails.

Moreover, we are now aware that the political strength of the farmer in Congress is on a perceptible, if not very measurable, decline. After months—in fact, a year and a half—of efforts by the House Committee on Agriculture to construct a general farm bill it did manage to report out (by a 22-12 vote) a weakened and battered version of the original Poage bill—the Farm Surplus Reduction Act of 1960, so-called. Whereupon the House defeated the measure, after certain parliamentary maneuvers, by a 170-236 vote. Although there are, again, many factors involved in this political action, ". . . more than anyone else, defeat was at the hands of city Democrats who sided with the GOP top command in the showdown."[6] Only

[4] Walter W. Wilcox and Clifford R. Hope, "How Farm Policy Proposals Become Legislation," *Farm Policy Forum*, Vol. 12, No. 4, 1959-60, pp. 7-16.

[5] *Nation's Agriculture*, June 1960, p. 6.

[6] *Farmers Union Herald*, Vol. 34, No. 13, July 4, 1960. However, the National Farmers Union *Washington Newsletter*, Vol. 7, No. 21, July 1, 1960, contains a somewhat different version: "A majority (three-fifths to two-thirds) of the Democrats from labor districts voted for the bill."

ten Republicans, all from rural districts, voted for the measure. Of course, the USDA and the Farm Bureau did labor ardently to defeat the bill.

For reasons that cannot be delved into here, it may be possible for the farmer to withstand this diminution of power throughout this decade, as a guess. But the political handwriting is clear, and the clearer the script the less will the USDA, as presently organized, be an effective instrument of public policy.

What Are the Prospects?

What is the future of the USDA? If Dr. Allin is correct, then the Department will become more and more concerned with the needs and demands of the commercial farmers and the related agribusinesses. What role will it then play in the enactment and administration of public policy?

Again, the outlook seems to be one of diminishing authority for the USDA. As I understand it, the agribusiness approach seems to call for a sort of private cartelization of American agriculture: there is in process a functional and policy integration, vertical in direction, from the producer through the distributor of food and fiber products. If permitted to continue, and properly directed, the contention is that this approach will benefit the producers, the processors, the distributors and the nation. However, there appear to be conflicts of interests evident herein, as well as a kind of modern version of agricultural fundamentalism. Just how the advancement of the agribusiness concept would affect the USDA as an instrument of public policy is not at all clear, at least to this discussant.

Viewing the future role of the USDA, relative to price and income policy, the alternative approaches seem to number at least three: (1) the use of publicly administered prices for farm products—the Poage road, we might say; (2) the development of real private bargaining power by the farmer, the farm cooperatives, and farm-related businesses—the agribusiness concept; or (3) the return to a substantially free market. The first approach would almost surely increase the power of the USDA; the second would probably diminish the USDA's authority; and the third road would openly lessen its influence.

However, I would request Dr. Allin to view briefly the future prospects of the USDA as an instrument of public policy from two different points of view which we shall term the organizational and the political. The two can hardly be separated but in the first the future organizational structure of the USDA will be considered, and the second will constitute a look at the political relationships which will confront the Department in the coming Administration.

I. The Organizational Prospects

We shall assume that the Executive Departments are a mirror of the social and economic forces of a particular time period. There is a political

lag, no doubt, but over time we would expect, even hope, that the public bureaucracy would, in organizational and policy terms, be a fairly accurate reflection of the dominant power groups of the age.

In light of the foregoing comments, what have been the past organizational trends within the USDA? The Department of Commerce received the Bureau of Public Roads in 1939 and the Weather Bureau in 1940; the Bureau of Biological Survey went to Interior in 1939 and the Food and Drug Administration moved to the Federal Security Agency (now the Department of Health, Education, and Welfare) in 1940. The Farm Security Administration finally succumbed in 1946 to its political opposition and was resurrected in the debilitated form of a Farmers Home Administration. The Bureau of Agricultural Economics was stripped of its central planning function during 1946, then in 1953 it was abolished; and the Farm Credit Administration that same year achieved, again, an independent status.

But these losses have not seriously weakened the USDA, one might well argue, and there have been a few organizational gains. Nevertheless, I think the future of the USDA can be viewed with at least some trepidation. Why?

(1) The Department of Health, Education and Welfare is clearly gaining organizational momentum and, in terms of power, where someone gains another loses. To put the issue bluntly, why should not the use of all chemicals be regulated by HEW—weed killers, food additives, antibiotics, etc.? How about the school lunch and special milk programs, the direct distribution program, and the use of Section 32 funds? Where should the administration of, for example, the Perishable Agriculture Commodities Act be carried out? And (is there no limit to heretical ideas?) how about the Federal Extension Service and its educational responsibilities?

(2) The Department of State lost some control over agricultural attachés in 1954 but it has by no means given up hope. In 1959 there was considerable talk, even bills, about the need for an independently administered "Food For Peace Program".

(3) Interior, or at least Mr. Ickes, never forgave Henry Wallace and Rexford Tugwell for the 1935 loss of the Soil Erosion Service (now the Soil Conservation Service), and the perennial issue about the Forest Service is still brewing, as evidenced in the Fish and Wildlife Service Act of 1956.

(4) The Rural Electrification Administration is assuming a distinctly urban complexion, at least consumer-wise. During fiscal 1960, 5 out of 6 of its new patrons were non-farm.

(5) Last year the Secretary of Labor took a forthright stand in favor of improving the plight of the domestic and foreign migrant laborers. The support that he received from organized labor and certain religious groups

brought about a hurried defense of existing laws and their administration by the USDA and certain farm organizations, followed by at least a partial victory for the Secretary of Labor.

(6) What if we create a Department of Science, as certain Congressional bills now propose to do? Would major elements of the Agricultural Research Service remain within the USDA?

(7) How about the increased jurisdiction of the Federal Trade Commission in the regulation of the processing and wholesaling of meat and meat products, as permitted by the 1958 amendments to the Packers and Stockyards Act?

(8) There is the matter of organizational disunity within the Department itself. In a real sense, this is probably a rather generic condition—someone has remarked that the USDA is actually a collection of semi-autonomous bureaus. But the present disunity seems to be ideological and not just functional: Those in the administration building know where the Holy Grail is but can't seem to get Congress down the "right" path; the East and West wings are not quite so certain about either the path or the goal, but are hardly in a position to break ranks; and the South Building seems to have elements which range from the loyal opposition to the indifferent. Perhaps we have herein another example of what Edwin Dale has recently referred to as "the conservative in power: a study of frustration."

II. The Political Prospects

Let us peruse quickly the changing political relationships that may occur between the USDA and the major institutions of our national government. If we use Hobbes' definition of power—the present means to achieve some future apparent good—what will be the political setting in which the USDA will be seeking to utilize whatever elements of power that it may have at its disposal during the coming Administration?

(1) *The USDA and Congress*

The 87th Congress will almost surely be controlled by the Democrats. The Republicans would need to gain some 66 seats in order to control the House and it would take several political miracles for them to control the Senate. Thus the committee arrangement in the Senate and House Committees on Agriculture (and Forestry, in the Senate) will be as presently constituted, with the Republicans having perhaps better than the present 2 to 1 ratio.

However, a Nixon Administration would almost surely assume more political flexibility and strategic abilities in the areas of farm policy than has the Eisenhower Administration. If a "gigantic" soil bank program is the cornerstone of Nixon's new farm policy proposals then there will be a genuine Executive/Congressional conflict on this issue, but campaign

proposals are more concerned with votes than policy.

A Kennedy Administration would quickly discover that its fiat is less than the law of the land. Congress, notably Southern Democrats and Midwest Republicans, is hardly in a mood to accept stringent production controls or production payments.

In either contingency, the USDA will have its policy difficulties. The President controls the veto and the removal powers, but Congress still controls the purse.

(2) *The USDA and the Executive Office*

Whoever the next President may be it is practically a certain conclusion that he will take a dynamic and positive role in the area of farm policy. That is, the political executives in the USDA will be pushed rather than just being the pullers. At the same time, the approach will probably be less ideological than is true at present and the career executives in the USDA may be able to develop policy proposals of a more varied and pragmatic type than would now seem to be possible.

Moreover, it appears that either Kennedy or Nixon will demand a closer integration of foreign policy and farm policy. The USDA will be called upon to develop a forthright and aggressive international policy for American agriculture much beyond the limited and negative approach of dumping unwanted surpluses.

(3) *The USDA and interest groups*

The American Farm Bureau Federation has access to the present political executives in the USDA, but not to the Congressional leadership. With the National Farmers Union, the situation is reversed. The National Grange has access in both directions although more limited influence.

Farm interest groups are becoming increasingly more partisan-oriented. The Farm Bureau has influence with certain Southern members of Congress and the Farmer Union can exert real pressure on some of the Republicans from the Great Plains, but the party preferences of their respective national leadership is evident.

Where will this coming election leave the USDA in its relations with the dominant interest groups? If Nixon wins, the Farm Bureau will, I believe, have to trim its ideological sails in order to receive the new current. He is a politician and understands American politics. Kennedy has the same attribute but he may listen primarily to certain Senators, namely, Humphrey and Symington. However, the Farmers Union hardly looks upon either of them as a political pariah.

(4) *USDA and the national political parties*

Neither Presidential candidate would, if elected, appoint a Secretary of Agriculture who was unacceptable to the major power groups in his party or retain him in office if he lost that support. But both parties are con-

fronted with the same dilemma: how to develop a farm policy which is acceptable to the urban consumers who will elect a President, and, at the same time, improve the income situation of the farmer and the small town business man who are so influential in Congressional elections. All the political and career executives in the USDA will have to do is to provide the legerdemain!

A Kennedy Administration would attempt to strengthen the farmer committee system. If Congress should legislate more stringent control-type procedures these revived farmer committees might, and probably would, complicate the policy-executing tasks of the USDA.

(5) *The new Secretary of Agriculture and his recruitment policies*

It would be folly at this particular meeting to do more than broach the question—who will be the chosen few? But Charles Hardin has an axiom which is pertinent to this situation: policy is made in the interstices of administration. Despite all the avowals about academic neutrality, a valueless science of economics, and the like, the answer to the above question will tell us a good deal about the policy directions of the USDA in the coming years.

In conclusion, let me first state that the foregoing comments are not advanced as counsels of despair or as the embittered rumblings of one who holds the USDA in disfavor. I would assume that nearly all, if not all, of us in this audience have a deep affection for the USDA and are definitely concerned about its future. Throughout the last several decades the USDA has often been a sort of standard bearer for the qualities which we have sought in a federal bureaucracy—intellectual integrity, administrative efficiency and ingenuity, internal esprit de corps, vigorous leadership, and political responsibility.

Nevertheless, we are rather forced to the conclusion that any administrative organization is a means to certain ends—the improvement in farm income and the quality of farm living, the advancement of the quality and quantity of food that is supplied to the consumer, the preservation of our landed heritage, and the pursuit of what we might term the national interest of the United States. There is the problem of defining these ends but my comments have been directed primarily to the matter of means. That is, considering the relentless changes that have been occurring in the social and economic structure of American life what kind of institutional and political changes seem to be in the offing for the USDA? We are heading into a new political environment; new frontiers and new strategies will be our challenge. What responses might we anticipate that the USDA should and will be able to make in order that it may continue to be an important instrument of public policy?

THE CENTER FOR AGRICULTURAL AND ECONOMIC ADJUSTMENT

CHAIRMAN: EARL O. HEADY, IOWA STATE UNIVERSITY

THE CENTER: A DESCRIPTION[1]

J. CARROLL BOTTUM[2]
Purdue University

THE creation of the Center for Agricultural and Economic Adjustment at Iowa State University was an outgrowth of the farm problems of our time. The Center might have developed at any of our land-grant institutions but that the request of a group of Iowa farmers should have first found such a strong and formal response at their land-grant institution seems quite natural in retrospect. Here was a dominantly agricultural state where the legislators and the regents of the University were sensitive to the changes taking place in agriculture and to farmers' problems. Here was a president of a university with an agricultural background and here was an agricultural and economic staff of the size and quality that was accustomed and capable of experimenting in new areas.

The significant fact about the creation of the Center is not the area of work to which it is devoted but rather the emphasis placed upon it and the formal recognition of the institution's responsibility in this area. The purpose of the Center as set forth to the staff on July 1, 1958, was as follows: "The major objective of the Center for Agricultural Adjustment is to help gear the farming industry with the trends of a rapidly growing national economy. The goal is to specify adaptations in production patterns, resource use, supply and demand that will allow agriculture in future decades to have resource returns which are more nearly on a par with those of other industries." Every land-grant college has and is giving varying degrees of attention to these problems. But in none of these institutions up until the time of the establishment of the Center at Iowa was the responsibility so formally recognized by the institution and by those responsible for the funds and administration of the institution.

I shall attempt to describe the forces and the philosophy which led to the establishment of the Center and its activities to date. Not because anyone is interested in duplicating it, but rather with the thought that any of us in our institutions who are increasing activities in this area must

[1] Previous to September, 1959, the Center was called "Center for Agriculture Adjustment," thus the reason for reference to two names in this paper.

[2] Acknowledgment is made to Dr. Earl Heady, to other members of the Iowa State University staff, and to certain farmer members of the Iowa Farm Study Group for information presented in this paper.

wrestle with many of the same questions and forces that those who established the Center did. Perhaps we can gain a little insight from their experiences.

The Origin and Development of the Center

Various groups at Iowa State University had discussed the need for tackling more rigorously the economic and social adjustment problems facing agriculture. However, these were like the usual staff "over the coffee" discussions. The advisory council for the Cooperative Extension Service made up of farmers and farm women, had also suggested that more work should be devoted to the adjustment problem. However, the clincher for action came with a letter from a group of Iowa farmers in October 1956. It was addressed to the President and the Dean of Agriculture. In it, the farmers pointed out that price elasticity of farm products was low and that according to these figures, producing more reduced the gross farm income. Therefore, they posed the question of how Iowa State University could best help farmers. They raised the question of whether the institution could reallocate its resources so as to devote more of its research to the problems of economic change.

In response to this letter, the agricultural administration called a group of staff members together, suggesting that they meet with the farmers and discuss with them their problems. Accordingly, three meetings were held with this farmer group beginning in November 1956. The farmer group indicated that it served as a friend to Iowa State University and would even like to help the institution get additional funds for research if they knew what the funds might be used for. A staff committee was then appointed to propose needed research. A short research outline or brochure was drawn up. Then the staff again met with the farmers. The farmers went over the list of proposed research projects, suggesting some additional projects which might be useful and a few that might be deleted as least important in the total process of social change ahead.

At this stage, the administration set up a planning committee to decide what they should next do as an institution. This committee decided it would be useful if the whole staff in agriculture could be brought up to date and made more aware of the major economic and technological problems that now face agriculture. The decision was that maybe the staff itself was not close enough to the over-all problems of the industry or perhaps was too close to its own particular calculating and laboratory problems to see those of the industry.

Accordingly, a staff committee was set up to plan a staff seminar. This seminar committee was composed of an interdisciplinary group from all departments as well as from research, education and teaching. The committee spent about two months planning for a seminar. Finally the semi-

nar evolved, which resulted in the preparation of three basebooks. The purpose of these seminars was (1) to outline the nature and magnitude of the farm problem, (2) to better explain its causes, and (3) to suggest possible lines of solutions which might be available.

Staff members were assigned papers. Persons assigned papers included those from the various technological departments as well as the social science department. Papers were written up ahead of time and circulated to the whole staff so that they read them before the meetings. Then the regular meeting held once each week for a whole term was largely devoted to discussion. Fifty people were designated from the various departments by the Dean of Agriculture. They were told their responsibility during this term was to attend these seminars and either help explain why the hypothesis and presentations made were those that prevailed or if they were not, what was the situation. It was pointed out at this time that a publication would be prepared indicating the general Iowa State University staff's reflections on these problems of agriculture.

Near the end of the seminar, the committee met and decided that it was not sufficient to simply stop with a seminar. It was suggested that some kind of organization should be set up which would keep attention focused on the adjustment problem. At first the committee did not have much notion of the type of organization that could best serve this purpose, but the idea of having a Center cutting across all departments and tying together research and education was proposed. This committee took this recommendation back to the over-all seminar group at its last meeting. The seminar group unanimously approved the idea. Hence the seminar group of 50 persons proposed to the administration that a Center be established. The administration heartily approved, and took the proposal to the President. The President was interested and excited about it and proposed it to the Board of Regents. Similarly, the Board of Regents were enthusiastic about the opportunity. This was mid-summer, 1957, a legislative year. The administration took the research outline mentioned previously to the legislature in the form of a budget request. The legislature passed an appropriation of $100,000 per annum for research in this general area. At the same time, they passed a resolution unanimously commending Iowa State University for being willing and foresighted enough to concentrate research in this area.

The administration then appointed a planning committee to decide how to set up the activities. At first the committee focused its efforts on research. Soon, however, it decided that the Center's activities should emphasize education. The reason was: Because even though economic facts are established, commercial companies do not carry these ideas out to the public. Yet, they are ideas and concepts that should be gotten to the public. Technological discoveries and research provide private firms

with information which they may incorporate into their products and sell to the public. What, it was asked, is the usefulness of more adjustment research as long as it ends up hidden on the library shelves and in the bulletins and journals. It might just as well be buried on the corner of the campus. Therefore, it was decided that the Center should equally emphasize education. It was felt that improved policies for agriculture were not likely to come about until the general public knew the consequences and alternatives available to them. From this point on, the committee incorporated concepts of education and research both into the Center.

It was felt that if a Center was set up with a half dozen persons set aside in a corner of a building by themselves, traditional and conventional research and education would be carried on by the other staff members in the same manner as at the present time. The regular staff would look upon the half dozen people as responsible for solving the problems in this area or attempting to do so, as they "went about their business as usual." Thus, to get a more permanent and interdepartmental redirection of effort, it was decided to set up the Center in the regular framework of the Agricultural College, Experiment Station, and Extension Service.

Thus it became a part of the educational and research organization on the campus. A portion of the Agricultural Experiment Station budget was designated as that of the Agricultural Adjustment Center. Staff members on research were designated as members of the Center if they devoted part or all of their research to this effort. Core staff members devote one-half or more of their time to Center activities. Contributing staff members devote less than half their time but have one or more activities.

Staff members are named to this work from most of the major departments in the College of Agriculture. The staff includes economists, sociologists, agronomists, animal husbandry specialists, persons working in human nutrition, food processing and others, including political scientists.

In the early stages, the President of the University met with the whole staff in the College of Agriculture. He told them that they were broadening the concepts of research and education in the institution. He also stated that they and other land-grant colleges had previously devoted too little attention to the major policy, economic, and social problems of agriculture because they were afraid of the pressures from the outside but that now they were going to intensify their efforts in this area. Hence there were enthusiasm and real backing through all administrative lines and levels.

The Center committee next decided that they needed resources to attack the educational problems. They approached the Kellogg Foundation for funds for education and research. In September 1958 they were given a grant by the Kellogg Foundation for funds to carry on educa-

tional work. It was felt that it was not sufficient that educational programs in this area be carried on in a limited number of states, but that they needed to be spread in all states. The funds from the Kellogg Foundation were made available for a five-year period and were provided on the basis that they be used largely, although not entirely, for encouraging educational work in other states.

The Center for Agricultural and Economic Adjustment is now organized as a functional unit of Iowa State University's College of Agriculture under the administration of the Dean of Agriculture. Two committees serve the administration in guiding the Center, the first, a University committee made up of 10 persons representing the major disciplines concerned with agricultural adjustment; second, a national advisory committee of 11 people consisting of land-grant and private college administrators, a representative of the Federal Extension Service, and prominent farmers from various sections of the country. The direction of the Center's activities is placed in the hands of an executive director and an educational leader, supplemented by an editorial assistant, a member of the Iowa Agricultural Economics Extension Staff in Public Affairs, and a visiting professor from one of the land-grant colleges.

Activities of the Center

In describing the activities of the Center, one cannot help but be reminded of the proverbial story of the blind man's image of the elephant as he felt each part; for the Center has sponsored many activities and some people have participated in one phase of its activities while others have participated in another. The farm leaders who helped inspire the Center probably have a different image of it than the farm families who participated in the extension challenge program in Iowa; or the researcher on the Iowa staff who saw the research program being reoriented; or the research worker in other land-grant institutions who took part in the workshops sponsored by the Center; or the extension staffs of other land-grant colleges who participated in the cooperative activities sponsored by the Center, the National Agricultural Policy Committee and the Farm Foundation; or the administrators who saw the Center as a catalyst sponsoring efforts which might provide them with a better basis for their making adjustments in their own institutions; or finally, the rural and metropolitan press representatives who saw the Center attempting to analyze with them the adjustment problems facing agriculture.

Activities within Iowa

As indicated earlier, the appropriation from the Iowa legislature was to increase research in the adjustment area and the appropriation from the Kellogg Foundation was to be largely used outside Iowa for educational

purposes. Therefore, let us first look at the program within Iowa. Two activities in addition to the many conferences held in connection with the development of the Center seem particularly worthy of note: (1) The attempt to define research in this area, and (2) the challenge program which was an attempt to take information concerning the adjustment problem to the people of Iowa. A multilith prepared for the staff of Iowa entitled "Criteria for Agricultural Adjustment Center Research" perhaps best defines the efforts to delineate the adjustment research area. It states:

Technological progress in agriculture allows an increased productivity of manpower. Facing as it now does political opposition of governments controlling a major portion of the world's manpower, the United States must increase and develop productivity of labor (1) in meeting military aggression, should the need ever develop, and (2) in contributing resources which aid in the economic development of other nations, which in turn allows them to retain an independent social structure.

But in accomplishing these long-run goals, it must be recognized that some of this research can give rise to short-run problems as the effects of increased output and increased resource productivity are not immediately "digested" into the national economy. In the short-run, increased output can give rise to surpluses which depress prices and incomes or cause some resources such as labor to become excess (i.e., most technical improvements allow the nation's food requirements to be produced with less labor). Since the long-run effects of research of the cost-reducing and output-increasing types are highly desired and necessary, the role of adjustment research is that of (a) facilitating the "digestion" of potential gains from these other types of research into the general economic or industrial system, (b) lessening short-run problems created by increased output and resource productivity in agriculture, (c) bringing returns to resources in agriculture up to a par with those in other industries, (d) helping to insure that the gains from technological advance from usual types of research are realized more quickly and fully by consuming sectors, including both farm and city families, and (e) in general, bringing about a more efficient allocation or balance of resources, both within agriculture and between agriculture and other sectors of the economy.

Using this distinction, adjustment research is defined as that which contributes to these ends:

1. Explains the nature, cause and effects of the adjustment problem as it relates both to agriculture and communities.

2. Allows prediction of the nature and extent of adjustment required to restore balance in agriculture.

3. Leads directly to policies or developments which improve the short-run income position of agriculture and restores long-run structural balance, in terms of resource returns, between agriculture and other industries.

4. Promotes directly the improvement of the marketing system and the economic and social mechanisms through which farmers exchange products and resources.

5. Results in increased demand for farm products through chemical, physical, biological, economic or other research which (a) improves the quality, form or grade of agricultural products, (b) creates improved strains or kinds of products, (c) creates new industrial or other uses of existing products, or (d) expands outlets for existing or new agricultural products in foreign markets or through

improved human nutrition and greater per capita consumption in this country.

6. Allows specification of more efficient or desired uses of natural or human resources of agriculture, relative to the present demand for products and prospective needs of a progressive economy.

7. Directly clarifies or removes obstacles to the attainment of 1-6 above or establishes the possibility or lack of feasibility of any of the above.

The second activity involved taking to the people of Iowa through the Extension Service a program which attempted to explain the nature of social change, economic growth, and its consequences. It was called the Iowa challenge series. The full resources of the information service were mobilized for this purpose. Television programs, self-administered fact sheets, and many other materials and information were gotten into the hands of the people in Iowa. The program was based on six topics, one for each week of the program. Nearly 32,000 sets of fact sheets were distributed. Nearly 40,000 people attended about 1300 meetings conducted by extension personnel. In addition, many people saw the program in their homes. Some 900 discussion groups participated in discussion meetings and nearly 600 classes in over 500 different high schools were involved. In the second year, economic leader workshops were organized which brought to farm and nonfarm people, educational material in an interesting form aimed at explaining world problems and national problems and how both of these relate back to their own community and how the Iowa situation fits into a broader setting. President Hilton of Iowa State University stated that he felt that this extension activity contributed much to a better understanding of the problem, to a better appreciation on the part of the people of Iowa of what the Iowa State University was attempting to do.

Activities outside the state of Iowa

The activities sponsored by the Center outside the state of Iowa may be divided for purposes of presentation into four activities: (1) Those involved in assembling information, (2) those involved in providing aid to educational workers, (3) those giving assistance to the land-grant college administrators, and (4) those devoted to direct educational work with special groups.

These activities involved in assembling information included six seminars or conferences. The subjects of these seminars or conferences were as follows:

1. Problems and Policies of American Agriculture–1958.
2. Seminar on Demand for Farm Products–1959
3. The Feed-Livestock Situation–1959.
4. Symposium on Capital and Credit Needs in a Changing Agriculture –1960 (co-sponsored).
5. Dynamics of Land Use–Needed Adjustments–1960.

6. Goals and Values in Agricultural Policy—1960.

These seminars and conferences represent an attempt to bring together in usable form the best information now available in our institutions in these particular areas. The papers presented at these seminars are or are being published and made available to all other land-grant colleges and others. They have provided an opportunity to appraise where we are, factually, methodologically, how we are handling problems in the value areas, and where some of the gaps are in our knowledge. To some who have participated in a number of these conferences, they may appear as a far step from the goal of bringing about understanding of the problems on the part of the entire public, and while it is recognized there is a limit to the number of seminars that should be held, they have made a contribution from the viewpoints previously listed and by bringing together background materials needed in the adjustment program.

The activities devoted to directly aiding educational workers with their educational programs involve seven activities: (1) The preparation of a national basebook on agriculture—present situation, projected trends, (2) the preparation of a publication entitled "Agricultural Adjustment: A Challenge and an Opportunity for Land-Grant Colleges," (3) the preparation of a publication series entitled "The Farm Problem: What are the Choices?" (4) Discussion Handbook for Extension Summer Schools, (5) the offering of a consultant-seminar for states inaugurating major educational efforts in agricultural adjustment, (6) assistance in the development of materials for the national agricultural policy conferences, and (7) assistance to the Committee on the Development of Rural Sociology.

The Center has joined with the National Agricultural Policy Committee and the Farm Foundation in sponsoring the National Basebook for Agriculture and in sponsoring the publication entitled "The Farm Problem: What are the Choices?" It has also assisted the National Agricultural Policy Committee in the development and planning of the national agricultural policy conferences, which have been entirely sponsored during the previous years by the Farm Foundation.

In its work with the administrators of the land-grant colleges, the Center has cooperated by presenting the adjustment problem to the directors of extension at each of their four regional meetings. Each of the regional directors' conferences has now established a committee from their region to work with the Center on the adjustment problem. The Center has also assisted the states in developing workshops on an area and regional basis which involve the college of agriculture staffs of the land-grant colleges in an attempt to aid them as they develop more formalized activities in the adjustment area. Excellent response was encountered in the work with other institutions because every other land-grant college was also interested in and making changes in their programs to better meet the over-all problems of agriculture as an industry.

The fourth activity of direct educational work with special groups has involved conferences and workshops with (1) editors of agricultural magazines, (2) editors of metropolitan newspapers and national magazines, and (3) individual farm policy study groups.

Two workshops with agricultural editors have been held, which have dealt with the farm problem and its alternative solutions. Conferences have been held with the editors of the metropolitan press in New York and Washington and with national magazines such as *Time* and *Life* and *Reader's Digest.*

In the spring of 1959, a five-state farm study group was brought to the Center to discuss and appraise the adjustment and policy questions of agriculture. This group met for a second time in the fall of 1959, and has been responsible for stimulating the formation of individual state farm policy study groups in Iowa as well as in other states. Where these farm policy study groups have been organized, individuals and materials from the Center have been used in their activities.

Naturally many presentations relative to the Center's purposes, organizations, and activities have been made to groups and many individual conferences have been held relative to the adjustment problems.

Conclusion

Up to this point I have made no attempt to appraise the objectives or the accomplishments of the Center. This has been assigned to others on this program. Neither have I attempted to relate its activities to the work of the National Agricultural Policy Committee or the work of the Regional and Interregional Price Policy Research Committees, or the public affairs or research programs now being carried on by individual states. Neither have I made any appraisal of the future of the Center or how many other Centers or activities of a similar nature may be established in our land-grant colleges in the future. However, in closing I should like to make three points:

(1) That the nature of the problems of agriculture and rural people is changing. A major one is the failure of the adjustments in agriculture to keep pace with the current rates of technological progress. These lags are creating acute local, state and national problems. These adjustment problems have reached the stage where rural people are saying that they must be given the same attention by the educational institutions as is given to the problems of technology. The Colleges of Agriculture, the Agricultural Experiment Stations and the Extension Services were created when the problems of rural people were largely technological. For this reason, most of the work in the agricultural institutions was technically oriented. Technical progress was so slow that it was assumed that the adjustments that must accompany progress would automatically

take care of themselves. But they have not. To meet the problems of rural people today, therefore, involves broadening the scope of the activities of the land-grant colleges. This calls for reorientation of their programs, the development of new subject matter and the use of new educational approaches to meet these new types of problems. Therefore, the land-grant colleges, regardless of the future of the Center, will be devoting more of their resources to the problems to which the work of the Center has been directed.

(2) That regardless of the Center's future, history will give it credit for helping to legitimize the work of the land-grant colleges in the adjustment area and in speeding up this phase of educational effort in our colleges.

(3) That adjustment and public affairs education will not tend to be centered in one institution, whether it be a land-grant college or the Department of Agriculture. However, individual institutions can make many real contributions to the society by spearheading the development of work in this area.

THE CENTER FOR AGRICULTURAL AND ECONOMIC ADJUSTMENT: AN APPRAISAL*

JOHN A. SCHNITTKER
Kansas State University

WHEN the President of our Association asked me to prepare an appraisal of the Iowa Center for Agricultural and Economic Adjustment, I resisted a little. One is justified, I believe, in hesitating to put himself into a position where circumstances might require him to be critical of persons and institutions to whom he owes debts which can never be repaid (as I owe debts to Professors Heady, Parks and Nordin, and to Iowa State University).

But I was careful not to resist too much, for the opportunity might never again arise; besides, I had some confidence in the legitimacy of the Iowa undertaking. So after a decent interval, I accepted. However, I retain some minor reservations about the subject of my paper. Final appraisal is a task for historians and critics after the fact. Few institutions mature so rapidly that even their potentialities can be justly appraised at the tender age of two or three years.

It is asking a great deal of forbearance of the Iowa professors and administrators to have an outsider conduct a critical public examination of the achievements of their young brain-child on their own premises.

The establishment of the Land Grant College system was more the result of a provident government than of a responsive government. There was a great long-range need, but only a small immediate demand for such practical and scientific study facilities. The foresight of a handful of leaders provided the start a century ago, and the persistence of many more carried it through the first stormy half-century to the emergence of the outlines of the modern land-grant university by about 1920.

The events which led to the establishment of the Center for Agricultural and Economic Adjustment were something of a contrast with events leading to the Morrill Act 100 years ago. The 19 articulate farmers who signed the letter to President Hilton and Dean Andre of Iowa State University in September 1956, questioning the existing direction of University activities, especially of the Agricultural Experiment Station, were also pioneers but not isolated pioneers. They represented thousands of less articulate but equally puzzled farm people—impressed with progress but apprehensive of change—and they were probably aware of it. Those at the University who received the farmers' letter and who later met with many of them, surely recognized that these men—these critics of the

* Contribution No. 339, Department of Agricultural Economics, Kansas Agricultural Experiment Station, Manhattan.

status quo, and therefore, of vested interests—were allies, not enemies, and should be treated as such.

Responsiveness is a distinctive mark of democratic institutions. Survival and growth and fame are hallmarks of responsive and perceptive institutions and people. The response of the Iowa State University administrators and faculty (meaning all professional workers) to the farmers' challenge to University activities, was, in my opinion, virtually a textbook example of the proper exercise of functions by both groups. This "proper function" is for administrators, to create an environment in which ideas can be received or originated, cultivated, examined, and exposed to public view for eventual public benefit. It is for the faculty, to concentrate its teaching and research energies on great problems and great issues of the past, present and future—on subjects worthy of great ideas and herculean effort, not on trifles and superficial studies. In relegating administrators to the job of "environment control," I do not imply that the administration of a university ought to be devoid of important ideas —only that its chief responsibility is to the intellectual climate of the faculty, not to itself, to the nebulous "welfare of the institution," or to raising funds and building buildings, however important the latter are.

It is, of course, the duty of administrators to grant or to refuse conventional suggestions for changes in the way the resources of the University are to be used. But the request of the Iowa farmers was not a conventional one. It was too insistent and too wise to be ignored, even if that had been the wish of the University. In tone, it was gentle and conciliatory; in fact, it was very critical of the existing agricultural research and education program of major divisions of the University. Since it was addressed to the University President and the Dean of Agriculture, it appeared superficially to be critical chiefly of those men—of the symbols of authority who direct research and teaching.

It is the faculty, however, not the president or the council of deans which is the heart of a university. In this era when "administrators multiply like hamsters" (as *Reporter* magazine recently remarked) it is pleasant and perhaps forgiveable to repeat the certain truth that one can conceive a university without students and even without a president or deans, but not a university without a faculty. Ultimately it is the faculty which must answer for relevance and vision and progress (or the lack of those qualities) in research and teaching programs. To their great credit, the administrators at Iowa State University recognized this, and they answered the challenge to the University—that is, to the ability and the integrity of the faculty—not by directing it to amend its ways or to write new projects, but by calling upon the faculty to undertake an intensive internal critique of the *status quo* in the Division of Agriculture at Iowa State University.

Criticism, like dissatisfaction and curiosity, is an essential ingredient of progress. A critical attitude toward one's own work is indispensable, but is seldom adequate. Formal defense, through publication or discussion, of what one is doing and the reasons for doing it, and of the research aims of institutions, in the presence of one's colleagues turned critics, is an experience many want to avoid at all costs. Some succeed, to the ultimate disadvantage of all of us. It is not to the credit of any professor or any University to permit such omissions. Research and teaching cannot be done in a goldfish bowl, but both suffer if not occasionally exposed.

I have not recently re-read the "Iowa Basebooks" which came out of the intensely planned and heavily attended seminars at Iowa State University in 1957 and 1958 nor do I think it important that I should have done so for this task. It is the process of broad involvement of the university—of the community of scholars—in critical discussion of ideas, which I wish to note and commend, not the specific results of such an exercise. If the faculty has been wisely selected and reasonably motivated, the public—the clientele of the University—need have no fears about the results. If the faculty is not well chosen, it is time to begin the search for a new faculty, not time to seek the collective counsel of the faculty which exists.

The Iowa seminars discussed and preserved an old idea—that the responsibilities of Agricultural Experiment Stations, Extension Services, or Land-Grant Universities are not fulfilled when they are functioning chiefly or exclusively as creators and distributors of new production technology, and that the problems which people, states, and nations face as a result of economic change are equally a proper subject for study and action. This idea remains a little revolutionary in many quarters, if not new. It conceives the divisions of agriculture in land grant universities as concerned with the entire social, economic, and even cultural life of their communities, and the communities as national and even international. It suggests that the division of American studies ought to be as integral a part of the University as the division of agriculture, and that the absence of historians and anthropologists from the scene is a serious omission. It proposes to require the professors to look up from the microscopic problems which may have come to seem important and pressing partly because someone was working on their solutions, so that they might discover what has become important and can thus help shape the larger events which determine destinies.

This old idea—that divisions of agriculture have responsibilities they have only begun to fulfill in interpreting the rural culture of the present and devising that of the future, is of interest chiefly to social scientists, who in the past have been too willing to run for cover chased by in-

sistent public dilemmas. I cannot convince myself that the physical and biological sciences can be closely attuned to the process of social and cultural adaptation. They will, however, provide an important impetus to change, and it is important that they understand the economic and social implications of their actions.

The central idea of the Iowa seminars posed the question Robert S. Lynd asked 20 years ago in his book *Knowledge for What?*[1] "Can the social sciences find ways to adapt our institutions and our people to the daily revolutions in physical technology?"

Faculties elsewhere and at Iowa had asked the same question long before 1956. Isolated persons had suggested the chronic nature of low returns to farm resources, and educational programs in some states reflected this point of view by 1956. Perhaps Iowa was simply behind, and set out to catch up, as some have suggested with pardonable pride. That point I have no wish to appraise. But whatever the case, it is significant that no one with whom I have talked seriously questions the guiding principle of the Center—that it is not enough to simple throw technologies into an archaic institutional structure. Others have claimed this idea as their own long before Iowa embraced it, and some claims are justified. Some may have done more within their own states to adjust research and extension to tomorrow than has been done so far in Iowa.

None, however, set out to evangelize the nation with an educational idea as Iowa has done. It is to the great credit of the Iowa people to permit and to the Iowa faculty to perform this task, once the validity of the major premise was widely accepted. They set out to do something for the rest of us—it remains to be seen whether or not they succeed.

The Center for Agricultural and Economic Adjustment as an institution with a national program grew out of the desire to preserve and to nourish the central idea—the need to either redirect or to restate the priorities for research and educational effort of the divisions of agriculture in land-grant universities. Implicitly there must also have been an intention to broaden the justification for publicly financed, basic research in food production. The case is clear, I think, that even though the basic agricultural sciences often do not "help" agriculture very much, they are indispensible to society, which should support them. In my opinion, the Center as an institution is in no way essential to the nourishment of its central idea, although it may be useful. As one on the scene at Iowa put the function of the Center as an institution, it was established to cut across department lines, and to tie together research and extension in approaching rural dynamics. This may be correct, but coordination is not a unique function of the Center. The dean, and the directors of extension, of the experiment station, and of resident teaching certainly cut

[1] Princeton Univ. Press, 1939.

across departmental lines, and they, too, have responsibility for coordination of research and extension. We must search further for real justification of the "Center."

I cannot believe that it was necessary for Iowa State University to propose the establishment of a new agency (the Center) to get $100,000 in new research funds from the Iowa Legislature in 1957 or 1958. I hope that the foundation which ultimately provided the support for the national educational activities of the Center, was not impressed by the appearance of establishment of a separate agency within established agencies, doing tasks the latter had not so far taken up intensively. To me there could be no more devastating criticism of state legislatures or of private education foundations than to show that they were impressed with such superficialities.

It was, in my opinion, the professional, self-critical, responsive attitude of the faculty and the university administration which impressed the legislature. It was, I suspect, the quality of the faculty and the glow of an idea which threatened to expose the central ideology of divisions of agriculture in land-grant universities—that technological research is chiefly for farmers, and that if such research is pursued successfully, other problems don't matter—which interested the Kellogg Foundation.

The useful device of a "Center" was adopted, I suspect, as a catalyst, a teaching aid—an attractive and strategic repository for unconventional ideas and actions possibly on their way to respectability and, hence, adoption by established, respectable agencies like agricultural experiment stations. The "Center," then, apart from its existence as an idea, is chiefly a symbol—a way station for those who propose to create a new face and a new frame of reference for agricultural experiment stations nationally. It is an instrument of peaceful revolution whose main objective, I believe, is to change the vocabulary, the actions, and even the composition of that group which is the decision-making elite in agricultural research and education in Iowa and the U.S.—the university presidents, deans, directors, department heads, and key faculty members, and the heads of several government agencies.

Whether it is to have a short or a long life depends on the response of those agencies it was designed to influence. Ideally, it will have a short life, expiring when the research and extension programs across the country which are the object of the project have been alerted to the urgent problems of farm and community change, and when the start of a broad new base of public support has been built for research in agricultural production not for farmers, but for the food needs of the next generation. If the Center has a long tenure as an institution it may well be the result of continued vindication of its guiding principle, but resistance to change by traditional agencies. If "Centers" of one kind or another replace many

of the functions of established agencies (like experiment stations) as many once feared, it will be largely the result of a lack of adaptability of such agencies to the demands of the times.

Of the three concurrent operations of the Center, (1) developing and contributing to a body of knowledge, (2) giving assistance to the land grant college system, and (3) direct educational work with special audiences, the second is the most important, for it aims to influence the "influentials." The direct phase of research (the first function) is essentially an Iowa task, and has been very modest. It has been augmented by valuable seminars which by now have become a bit repetitious. The half dozen seminars and workshops have fed heavily off accumulated ideas and research of others, to considerable public benefit, I suspect, if to the chagrin of some of the deans. Both Iowa and the contributors should be commended for this action.

The research function of the Center—to contribute to the body of knowledge on short-run problems—can scarcely be started directly with supplemental funds only from the Iowa Legislature. It can be conducted on a noticeable scale only after the research programs across the country have been influenced and redirected, a job only begun. Appraisal of the Center at this point leads me to the conclusion that the conference phase of the project has passed the peak of usefulness (although the forthcoming Conference on National Agricultural Policy may be an exception), and that the national educational phase is the most appropriate place for concentrated effort. Workshops for university administrators, like the one held at Moscow, Idaho, in May 1960, and others now scheduled, the proposed consultants seminars for 1961, the National Basebook on Agricultural Adjustment and the leaflet series on farm policy choices are impressive steps in a truly national program.

It is significant and appropriate that what started out chiefly as an external and internal critique of the research program at Iowa State University (and implicitly at similar institutions), has so far been chiefly an educational program feeding off the knowledge which was readily available from prior research, both at Iowa State University and elsewhere. It is partly the nature of research to be slowstarting; hence, we should expect that the research reorientation at Iowa under the auspices of the Center but conducted in the Iowa Agricultural Experiment Station is not yet far advanced. But it is also most appropriate that the nearly universal gap between professional knowledge and public political and social action has been recognized as one of the most fruitful areas of work. I am not one who is convinced that what is most urgently needed for improvement of private and public actions in agricultural affairs, is more research. What is needed, I think, is to pull together somewhat, the time outlooks of the scholar and the man of practical affairs with the knowl-

edge we already have, so that decisions are impeded as little as possible by obsolete information. As Lynd has said, "The gap between the two, while not sharp or even commonly recognized is significant . . . for important problems tend to fall into oblivion between the two groups of workers."[2]

Concentration upon problems of social, economic, political, and cultural issues brings with it a set of problems not faced by institutions which deal in non-controversial issues. Much of the effort of the Center would have been fruitless, indeed, without the complete approval by the President of the University of work in controversial subject matter areas. A faculty cannot work effectively under less than complete assurance that it has the support of the administration, not to say what it pleases on any subject, but to speak the truth even if it hurts, on relevant subjects. Again quoting Lynd, "It becomes inconceivable that anyone should consent to conduct his thinking under demonstrable restrictions, once those restrictions have been recognized. . . ."[3]

Much of the work of the Center—the unconventional work of the conventional agencies (Extension and Experiment Station) of Iowa State University—is heavily dependent on this unusual, if not unique, freedom of speech which the faculty enjoys. As Dr. Walter Wilcox said at a conference in Ames in June this year, there has been for many years a "conspiracy of silence" on public policy questions at most land-grant universities in the U.S. Happily, this era shows signs of ending. In my opinion, it is faculties, not administrators, who have the most reservations about public policy discussions. Freedom of expression is surely circumscribed in some land-grant universities. Most professors, however, have not even approached the limits which may have been set on expression, but have set their own, much more restrictive limits. We can scarcely complain about limited freedom of expression until we have really found out what the limitations are. We will know their extent only when we have tested the restrictions. I suspect they are minor; that administrators who invoke them are extremely vulnerable and that professors who ignore them are unusually secure in doing so.

The people who conceived and operate the Center are also human and have made mistakes—perhaps even more than we know about. One possible major lapse was an apparent failure to work out an early, well-defined relationship with the Federal Extension Service. The two agencies appear, at a glance, to be competitive. The ultimate success of the Center, I am confident, rests on the success of its national program—its servicing (and thereby influencing) of land-grant universities who volunteer to be influenced. The FES also carries on a national educational program.

---

[2] *Op. cit.*, p. 1.
[3] *Ibid.*, p. 8.

When the Iowa group accepted the Kellogg grant tied to education, not research, it faced a problem of building a rapport with 50 state extension services and the FES, which had almost no part in the origin of the project. The Center had operated for about a year before the FES was approached formally. Ultimately, by working with extreme patience on both sides, and through the Extension Organization and Policy Committee of the Association of Land Grant Colleges and Universities, a fine working relationship has been built with FES. This surely increased the acceptability of the Center's national program. Perhaps the national program would have moved more quickly if relationships between the agencies had been formalized earlier.

But I do not wish to make too much of the possible competition between FES and CAEA programs. FES has an extremely limited mission. By virtue of location in the USDA it is, now at least, not well suited for pioneering in controversial areas. Nothing FES has done the last decade or two is so ambitious or pretentious as the CAEA undertaking. Yet the two have similarities, and it is better that they are allies than competitors.

The Center has been criticized for publication of some results of research in national magazines. I think the choice of media completely appropriate since the end is education and influence. However, we should recognize that such media are not technical journals. These media must sell themselves each week, and they do it shamelessly with superficial but effective gimmicks. One of these is the attribution of agricultural research chiefly to an IBM machine. Another is the tendency toward overgeneralization of rather limited and circumscribed results.

I favor taking such risks, but we should remember that large errors can be more costly there than in a technical journal. Circulated widely, large errors might influence public policy for the worse, while errors in technical journals are simply corrected in the next issues. Iowa has made no great error so far in this regard. The assumptions of the "free market study" published by *U. S. News* in late 1959 were restrictive but not far from what some groups have advocated. The Soil Bank did look like a rather simple device in the June story in the *U. S. News*. But these were minor lapses.

Related to this matter of publication is the problem of point of view. As someone has said, the world often seems less interested in whether or not professors are searching for the truth than in whether they are "for us or against us." Highly placed people told me in 1958 not to expect anything of the Center—it was set up as an apologist for *laissez faire*. In the past year, it has come under fire from poorly-advised persons for its "rigged studies" in favor of "government regimentation," and for its reputed efforts to set up a new power group to make public policy. The associated implication was that the Center was established for such purposes.

For the moment, I know of no reason to believe that the Center is for or against anyone, even though some of its reports imply gains to some and losses to others. In hundreds of discussions about the Center, I have found mostly profound admiration, much envy, and the ultimate compliment, imitation—except from a minority which would never suspect anyone of honest error, but is ready to question everyone's motives on the smallest provocation.

What of the future? As noted, ideally the Center should have a short life. Five or ten years should be sufficient time to evangelize and alert agricultural educators to the challenge of the future, or, at worst, to disillusion those who tried to do it. If a spirit of critical and constant self-examination can be communicated to most extension services and experiment stations by 1963, the Center will be, in my opinion, a major success, for that is the spirit essential to progress, and it is a spirit notably absent from many institutions in 1960. So far the Center has had only small success in this field, but it has created a sense of uneasiness out of which progress can be distilled, and that is quite a lot for a three-year old.

DISCUSSION: THE IOWA CENTER FOR AGRICULTURAL AND ECONOMIC ADJUSTMENT

RAYMOND J. PENN
University of Wisconsin

My first reaction to the Center was, "Why so much fanfare about a research and education program at a land-grant college aimed at helping agriculture make adjustments to meet new situations? Isn't this what the land-grant college system and USDA are supposed to be doing all the time?"

On further reflection and with further experience, however, I conclude that the establishment of the Center and the apparent evolution of its objectives and activities represents very considerable progress not only in the operation of a land-grant college but also for agricultural economists and other social scientists. The faculty and administration deserve much credit for the unusual kind of contribution the Center has been able to make.

The Center, we are told, is an institutional response to certain pressing questions being asked by Iowa farmers. First, the faculty made a thoroughgoing appraisal of the situation in agriculture and then of the present and potential role of the University. Dean Parks describes a whole philosophical point of view about self appraisal when he says, "The continued success of any institution depends on its being examined in an

objective and scientific manner, and upon its willingness to modify its operations in the light of the findings of such an examination."

One of the major initial ideas of the Center was that an integration of the ideas and knowledge of physical scientists in the production departments with that of the social scientist would open new avenues for attacking old problems. The faculty emphasized that a farmer's adjustment problem generally has its physical, economic, and social aspects. The University cannot, then, be of maximum help unless it can bring to bear all of its resources, regardless of departmental lines.

Over the years the land-grant college philosophy has been to help farmers make adjustments—but at first this was only seen as helping them to make their farms more profitable. The physical scientist would seek knowledge about a disease problem or a new crop variety; the farmer would then use this information to adjust his farming and make it more productive.

Many social scientists and particularly agricultural economists attempted to emulate the physical scientist and gain respectability by elaborate formulations of Marshall's theory of the firm. Given a set of prices, they felt that the most profitable balance of enterprises and hence the best use of resources could be determined with almost mathematical precision. Agricultural adjustment presents no problem, according to this set of ideas, so long as the farmer has the facts on which to base his farming changes. If the farmer still doesn't use his resources in the "best" manner, look for an obstacle in the way which must be removed. With exception of this last point, it was assumed that the solution to the farmer's adjustment problems was to be found in actions he could take with respect to his own farming business.

Economists at Iowa State University, as much or more than those at other Universities, started with and continued to elaborate the theory of the firm as a useful way of attacking most types of farm economic problems.

It seems to me that the initial purposes of the Center, Iowa's early staff seminars, the definition of adjustment research, and the challenge program, all show evidence of struggle to be released from the idea that the solution of the current farm problem is within the real alternatives of individual farmers.

In fact, of course, the main adjustment problems confronting Iowa farmers are problems that cannot be solved by actions on their individual farms. Gearing production to demand when price does not do it effectively, or building bargaining power for farm people to match the bargaining of those with whom the farmer deals, or passing a land use zoning ordinance, or establishing a watershed district are problems that require group valuation or policy formation and group action. "Efficient

allocation" is only one criterion to be used in policy formulation. And economists must look to other disciplines such as sociology, political science, and philosophy for some of the facts relevant to group valuation.

Solution to the most pressing current farm issues not only requires group action but increasingly requires approval and even participation of nonagricultural people. Agriculture by itself cannot take nor will it be permitted the sole responsibility for agricultural programs.

Thus the most important thing the Center has done, and the most important thing it can do from its position of leadership, is to join with other agricultural leaders in moving to a more realistic characterization of the farm problem.

The change in the name of the Center in 1959 to include "economic" adjustments certainly indicates an acknowledgment that solutions to agricultural problems cannot be found alone in the agricultural sector.

A seminar on "Dynamics of Land Use" seems initially to have been aimed primarily at adjustments in agricultural land use. But the shift I am discussing is certainly reflected by the fact that Land Use Seminar participants said they soon found it necessary to redefine the problem as one which required balancing all land uses whether for agriculture, industry, urban residence, highways or recreation.

The Center seminars on "Problems and Policies of American Agriculture," "Demand for Farm Products," and "The Feed-Livestock Situation" were in the nature of an appraisal of the current farm problem by a group of experts, primarily agricultural economists. These approaches seem to have fallen into the older, narrower mold of hoping that they might give birth to a statement describing sound agricultural policy if not specific farm program proposals. The seminar on "Goals and Values in Agricultural Policy" represented a major step forward. It recognized that good policy and programs are more than economic. Sociologists, political scientists, philosophers, religious leaders, and farm organization leaders, as well as economists, participated. There was no substantial dissent from the position that values—determinants of sound policy—draw their validity from many disciplines. However, the seminar still contained major emphasis on individual values which would be as useful to those who believe that individual farm adjustments can solve the farmers' problems as it to those who do not. More importantly, the seminar still seemed to be organized around the hope that a group of specialists could hammer out a statement of goals and values which would resolve the major policy issues and permit agreement on an agricultural program.

Perhaps we are at last, however, on the verge of agreeing that all policies must reflect compromise—sometimes between adverse parties, sometimes between conflicting values within the individual spirit. Conflicts will continue to exist. The issues and alignment of conflicting interests

change, of course, as one problem is solved and as others emerge. More than a "magic policy program" we need to seek an organization or a set of procedures which will facilitate persons or groups with conflicting interests working out acceptable compromises for the particular problem at hand. This is group valuation or policy formulation or planning.

The Center, with its Goals and Values seminar, with the formation of the five-state farm study group, and with its seminars for editors, is coming close to the heart of any solutions to the current agricultural problems—group action by both agricultural and nonagricultural people. The economist will find that in helping on policy questions he will need more than the theory of the firm in his kit of tools. He will need the help of other disciplines. Increasingly he will look for procedures and working rules which show promise of resolving conflicts. Such working rules or institutions are and will be the only possible instruments of positive implementation of group decision or policy. Often their absence is the sole or chief obstacle in the way of an individual doing what is best for him in the larger setting of the interests and needs of others.

As the Center directs its attention to this task it will find that each policy issue is unique. To the classical use of neat "if . . . then . . ." scientific propositions must be added the much more difficult task of understanding, recording, and classifying previous problem-solving attempts. The Center and the Iowa State University staff have come a long way in policy research and policy formulation. They are still moving, I feel, in the right direction.

DISCUSSION: THE IOWA CENTER FOR AGRICULTURAL AND ECONOMIC ADJUSTMENT

CARL HAMILTON
Iowa Falls, Iowa

We have heard two splendid papers on the subject of our Center for Agricultural Adjustment here at Iowa State University. Dr. Carroll Bottum gave us essentially a step by step history of the development of the Center. It was excellent and it was accurate.

Professor Schnittker examined the infant from a more subjective viewpoint and I find a very great deal indeed to agree with in Schnittker's remarks.

Against that background of these two fine papers, I would offer these few observations.

First I would like to examine this development—the Center for Agricultural Adjustment—from a rather philosophical point of view—and one that is really rather aside from the subject of our discussions. I would

like to look at this development from the standpoint of the lessons of democracy that we may have learned while we still are close enough to this project to remember at first hand some of the birth pains.

In that respect I have observations that in some ways appear to be somewhat in conflict.

The development of the Center is a refreshing experience against the attitude of indifference and cynicism which prevails with regard to so many of democracy's functions today. I refer to the common feeling that BIGNESS is so prevalent that the individual as such can no longer serve a useful function in democracy.

But here, with the Center, was the case of a tenant farmer and one of his friends sitting down one Sunday afternoon, after a week end of philosophizing about the aches and pains of agriculture, and drafting a short state document. Uncertainly, they showed it to a dozen or so of their farmer friends. The next step was described quite adequately by Bottum.

Now those two persons, and the others who joined, did not in any sense start the Center for Agricultural Adjustment. They simply tipped the balance, hanging heavy in the direction of their thinking, which in turn set off a remarkable chain of events.

Democracy still functions. The individual, willing to speak up, can still make his voice heard—even as in the days of Tom Paine.

I like to recall this little incident—in something of an aside here in these Proceedings—because of the "lift" that it provides.

* * *

Now let us examine the other side of that coin for a moment.

First let it be said that the men signing the original letter, which helped tip the scales, never met together. The document, now rather famous, went round robin, so to speak. The first time they ever met together was on a certain Sunday night before they were to meet here the next day with University officials—after they had been invited in—for what, they were not too sure of.

Two things came out of that Sunday night discussion:

1. Had they met together and talked their original document over ahead of time, it might have been stronger and firmer in tone than it was under the circumstances which prevailed. Upon examination it was discovered that they were even in more complete accord—and more vigorously so—than the tone of the document might indicate.

2. The statement was made at that meeting that the letter could have as easily carried 2,000 names as it did 18 or so—except for the mechanical problems involved. These men did not represent themselves as having

access to the only crystal ball in their communities. It was stated that several had trouble keeping those they approached from taking it to still more whom they felt sure were of a similar mind in their communities.

That, it seems to me, is rather significant. And it is one that all of us who are so jealous of the significant role which the Department of Agriculture and the land grant colleges have played might well ponder.

The Department of Agriculture and land grant colleges have one of the most elaborate pulse-taking apparatuses ever set up. It reaches down to the grass roots in every county in these United States.

Why then, if this sentiment was as prevalent as those 18 men found it to be, had not this apparatus felt the tingle and more completely reflected this fact?

This is, of course, a highly critical question—and I aim it not at this dear Institution which has taken such a courageous step but at our whole federal-state apparatus in the field of agriculture—and for that matter at other phases of our democratic institutions which serve citizens at their sufferance as taxpayers.

It seems rather frightening, and disturbing, to think that so much sentiment presumably prevailed for something like the Center, yet it took farmers themselves writing letters directly to catalyze and get this idea off dead center.

* * *

Bottum says that the Regents and the University were "responsive to the changes taking place in agriculture." He says they were sensitive. Yes, they were sensitive. But were they sensitive enough?

Schnittker points out, and properly I suspect, that the land grant system is more the result of a "provident" government than of a "responsive" government. There was only a small demand for such institutions as the land grant colleges, he maintains. And I think he properly emphasizes that the events leading up to the establishment of this Center were, as he puts it, "in sharp contrast" to those leading up to the Morrill Act of 100 years ago.

Land grant colleges are studying the Center. But more I think they might study and examine the background of the Center and re-examine their own role to see if they are as responsive as they claim to be—and should be.

* * *

I like the gentle way in which Schnittker raised this question of whether the Center, as such, was necessary at all. He suggests that the Center was adopted as a "useful catalyst"—"an apparent, strategic and temporary repository for unconventional ideas." He called it a symbol . . .

an instrument of peaceful revolution. He was right. We should not have to set up and create new names in order to get our land grant colleges to be responsive to the most pressing needs of agriculture.

Now, I know it was necessary in this case—and you know it was too. And we are proud and delighted by what has occurred here at the Center and at Iowa State. But in the long run let us hope this is only a tool or an excuse for gradually, and we hope not too gradually, bringing the telescope around to bear more directly upon our most pressing problems.

And it is so true, that so far the Center has been feeding largely on existing knowledge. This point Schnittker makes very aptly. The Center's big test is still ahead—to see whether it can harness some major part of the research engine to the objectives which underly the Center idea.

These critiques, given here today, are quite superficial—because, for all of the impressive lists which Bottum gave as he recited the Center's history, the Center idea, really, is still pretty much just an idea—and one to be proven.

DEVELOPING AN INTEGRATED EXTENSION PROGRAM—PRODUCTION, MARKETING, AND PUBLIC AFFAIRS—ON AGRICULTURAL ADJUSTMENT PROBLEMS

CHAIRMAN: TYRUS R. TIMM, AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

ACHIEVING AN INTEGRATED PROGRAM

C. B. RATCHFORD
University of Missouri

THE title assigned presented at least four alternatives for a paper. Attention could be given to developing an integrated Extension program, contributions of production, marketing and public affairs to adjustment problems, agricultural adjustment problems *per se*, or a combination of all four. I can add nothing to the large amount of excellent material that has been written on agricultural adjustments in recent months. Production, marketing and public affairs all contribute to the solution of most agricultural adjustment problems. The specific contribution of each can be determined, however, only for a particular adjustment problem.

I chose to devote the paper to describing an integrated Extension program, and how this is achieved. The procedures that will be outlined apply to developing integrated programs on any problem area in which Extension works. Brief attention is given to a discussion of agricultural adjustments and to the need for an integrated program. Most of the examples used relate to an Extension program on agricultural adjustment problems.

Adjustments defined

For the purpose of this paper, adjustments are defined broadly as changes that decision-making units (individuals, farms, business firms, organizations, governments) must make as a result of changes in demand, institutions, physical conditions, and technology. Those technological changes whose effects are completely internal to the decision-making unit are excluded as they do not create adjustment problems. This broad definition means that firms and the economy are constantly faced with adjustment problems. A brief and superficial study of agricultural history indicates that adjustment *is* a continuing problem. The type of adjustment which must be made varies widely within a short period of time. Within a single generation, the agricultural plant has been asked twice for unprecedented production, and has three times been faced with unparalleled surpluses and the need for reduction in the agricultural plant. Both types of adjustments were equally difficult from a technical point of

view, although the psychological attitude on the part of the farmer was quite different and hence, the reaction was different. The job of Extension in helping firms to adjust is fundamentally the same, regardless of the type of adjustment.

It is recognized that the major adjustment problems today relate to the overall supply of agricultural products, farm prices and income of farmers, the amount of resources devoted to agriculture, the structure within the agricultural economy, and the role of Government in agriculture. These are difficult problems, which apparently will continue as problems for some time.

The need for an integrated Extension program and method of achieving such a program are the same, regardless of the type of adjustment faced by agriculture. An integrated program is more difficult to achieve on current adjustment problems than when the adjustment is securing more production, largely due to a different psychological orientation. The need for an integrated program may be no greater in one situation than in the other, but the lack of an integrated program is more obvious, and more subject to criticism when we are faced with the current problems than when more production is the problem.

Need for an integrated Extension program

Many reasons for an integrated program can be listed. First, production, marketing and public affairs are part of a single process, the purpose of which is to produce goods for consumers and compensate those involved in the process. Public policy relates both to production and marketing and is designed to help the total process function smoothly, to change the relation of agriculture to the balance of the economy, or to change relationships within agriculture.

Second, conflicts within production, marketing and public affairs, or between the three, need to be avoided. Conflicts only serve to divert resources away from major objectives. In view of the size and difficulty of the problems and the limited resources that are available, Extension cannot afford the luxury of wasting resources in conflict. Conflicts also create extremely poor public relations for Extension and agriculture.

It is easy to find many examples of conflict in present Extension programs. It took only a few minutes to list seven conflicts that I have observed in the last few months. These are as follows:

1. Many of the present price support programs stimulate production at a time when overproduction is a major problem. In several instances, not even the need for controlling production concurrent with high price supports has been recognized.

2. The grading system and some Extension personnel have continued to promote production of heavy prime cattle, when consumers and mar-

keting specialists have indicated the desire for lighter cattle, grading low choice or high good.

3. Marketing firms have been encouraged by marketing specialists to venture into a quality egg program, but no attention was given to delivering a quality product from the farm. The importance of this was not even recognized. The reverse situation has been quite common in the past.

4. County Extension workers and even some specialists have joined with Chambers of Commerce to promote production in a local area of a product for which there is no market. The soil, climate and other conditions were ideal for production of the product, but there was no market.

5. Extension workers have worked with Chambers of Commerce and industry promotion groups to develop processing plants for which there was no economical source of supply.

6. Marketing orders, which have been promoted by Extension workers, have destroyed a production area that the order was supposed to help. This was the consequence of not understanding the policy promoted.

7. The grading system currently in use may not reflect consumer demand and may actually promote poor quality. One example is overprocessing of cotton at the gins. The present grading system stresses color and length of staple. Additional processing may make the cotton whiter, but it may seriously damage the spinning quality, which is the most important characteristic of cotton.

Characteristics of an integrated Extension program

A necessary characteristic of an integrated Extension program is a common set of objectives. Production, marketing and policy objectives must be the same. It is not sufficient, under my concept of an integrated program, to even have separate but non-conflicting objectives for the various phases. A second necessary characteristic is that the objectives mutually accepted by all areas must be internally consistent. One objective must not be in conflict with another.

This concept of an integrated program is easily stated, but extremely difficult to achieve. The difficulties are so great that few examples of a completely integrated program can be found.

An integrated program does not require all Extension personnel to do the same thing, or that they have the same training. Such is not desirable and is inconsistent with the trend within Extension toward specialization. It is necessary that the personnel strive within their prescribed field of work toward the objectives accepted by all groups. Failure to understand demands of an integrated program has resulted in all the staff trying to do the same thing, and this has resulted in a general weakening of the program.

A completely integrated program for Extension is impossible and undesirable

A completely integrated program is impossible for Extension for several reasons. First, Extension must be interested in individual decision-making units—the individual, farm, family, and firm. After all, education can be directed only to decision-making units. The interests of individual decision-making units may be in conflict with the interests of the economy and society with which Extension is also concerned. Second, the problem-solving approach, which is the most successful approach to education for action, directs Extension efforts to the interests of particular clientele. Education will result in action only as it helps one or more units achieve their personal objectives. The clientele we help with problem solving may be in conflict with each other. Third, Extension is morally obligated to supply all the information available on a particular problem. Often the information is not pointing to a single direction and decision-making units may use the same information to go in opposite directions. Fourth, Extension does not control the economic and political environment in which decision-making units operate. The environment often contains inherent conflicts. We can explain what the environment is and how best to operate within the environment. These situations, and others which could be named, make a completely integrated program for Extension impossible, except at the broadest possible objective level, such as improving the total economy.

A completely integrated program for Extension is probably undesirable, as such a program could be in conflict with some of the basic tenets of the free enterprise system, which I assume is one thing we are interested in maintaining. The system provides for many units acting to gain their individual interests, with competition serving as the regulator. Extension can further the system by helping individual units become more efficient and at the same time stimulating competition. Parenthetically, competition itself is somewhat inconsistent with an integrated program. Also, new technology is one of the great maintainers of strong competition. Extension, by conducting educational programs in new technology, has increased efficiency of individual units and stimulated competition.

Extension can go much further toward an integrated program and should, in order to render the maximum possible service to individuals and society

Many of the conflicts which are observable in Extension programs are not deliberate. They continue to exist because the conflicts have not been recognized and positive action taken to develop an integrated program.

There are a few examples where Extension personnel have been in such violent opposition to each other that they have carried their fight to decision-making units that Extension is serving. This has, in turn, resulted in completely unnecessary conflicts among segments of the farm economy. Conflicts which are not inherent, due to the facts and environment, regardless of whether they exist because they have not been recognized or because they have been deliberately fostered, should be eliminated.

The conflicts which are inherent parts of the environment should be indicated to the decision-making units concerned. One example of a current conflict, beyond the control of Extension and individual firms, is the desire for lean pork at the consumer level, but a pricing system, grading system, technology, or combination of these, which makes growing fat hogs profitable. Extension has no alternative in such a situation to advising the farmers on their most profitable alternative, which is growing fat pork. The Consumer Marketing specialists continue to stress the desirability of lean pork. The Public Affairs specialists can point out alternatives. All involved can indicate that the conflict exists and that there is need for the various decision-making units concerned to work out a satisfactory solution.

The possibility of an individual having community as well as individual objectives should be recognized by the Extension worker. To illustrate what this can mean, let us assume a hypothetical situation of a processing plant, providing badly needed employment for a local community, having to go out of business because apparently the farmers do not find growing the commodity being processed as profitable as other enterprises. Such a situation offers several alternatives for Extension workers. Extension can disseminate information which proves that the particular commodity is not as profitable to farmers as others under a particular set of conditions and hence, encourage the death of the plant. Another alternative is to follow a problem-solving approach and take a look at the problem in its entirety, which actually is the way our clientele view the situation. The problem-solving approach causes us to raise several questions: Can the commodity being processed be made more profitable to producers? Are there unused resources on farms, which, if not used to produce the commodity in question, will go idle? Can the plant, producers and community work out some reasonable system of subsidy that will keep the plant in the community? Perhaps the growers are so interested in having employment for their sons and daughters locally that they will continue to produce the commodity even if it is not their most profitable commodity. Extension workers need to help people understand the community, as well as individual objectives, and see if the two can be harmonized.

Public policies which do not achieve the stated objectives should be indicated to all groups who are affected by the policy. There are many examples where a public policy does not achieve the stated objectives. This is quite obvious to us, but many people do not translate from stated objectives to effect. If you doubt this, attend almost any farm organization meeting, where some of the policies currently being followed are being discussed.

Many conflicts can be avoided by pointing out to individuals and groups consequences of alternative courses of action. Understanding possible consequences before a decision on action is made could avoid many conflicts. After all, once a decision is made, there are a certain number of people who feel obligated to defend the action.

A general educational program should be conducted on the economic and political systems. Goals of society and effects of alternative aggregative action or public policies should be conducted continuously so the people will be more able to identify unnecessary conflicting action and determine alternatives that will achieve their goals.

Every member of the staff needs to be involved in the integrated program

Every staff member must be involved in developing an integrated program. This includes all specialists, supervisors, administration and county staffs. It is important that arbitrary lines not be drawn between the areas of production, marketing and public affairs and the many scientific disciplines. Each person should be encouraged to contribute to each objective, and most will be able to contribute to each objective, either directly or indirectly. The present Scope effort, in which most Extension Services are involved, is really an effort to develop integrated Extension programs. Experiences in states which have moved forward with this effort indicate that practically every specialist can make some contribution to each of the nine program areas.

Each person must respect the contributions of other staff members to the common objectives. The "dog in the manger" attitude, which is exhibited by some Extension personnel, is one of the bigger barriers to developing an integrated Extension program. As an example, it is not uncommon for an economist to feel that public affairs and marketing are exclusively the property of economists. Production specialists feel the same way about production efficiency and conservation. We must arrive at the point where each staff member encourages all others to contribute to each program objective. A more common failing than not asking others to contribute to a particular problem is not appreciating the contribution made. It is easy for economists to underestimate the importance of tech-

nology, and vice versa. If we are to achieve an integrated program, each discipline must strive to understand and appreciate the importance of the contribution of other disciplines to the objective.

Expect strong resistance to developing an integrated program[1]

There is strong resistance to developing an integrated Extension program for two major reasons. First, integration represents change, and resistance to change is normal. Program integration often involves changes in the role of the individual employee, changes in the prior relations of the various individuals, changes in the value and beliefs as to what is desirable, changes in methods of teaching, and changes in the communication pattern in the organization. Such changes tend to upset an established pattern of expectations and procedure, and give rise to feelings of insecurity in the individual staff members affected. Scheel lists typical expressions of resistance as follows: professing not to understand the new idea that is being suggested; marshaling arguments as to why the new idea will not work; postponing action to implement the new idea; attempting to show that the new idea already is being accomplished within the present pattern; attempting to shift responsibility to somebody else to figure out how the new idea should be applied, and blaming somebody else for the situation that makes the new idea necessary, or expressing hostility in other ways.

The second reason for resistance is a phenomenon mentioned by writers in both psychology and public administration, called "identification." Simon defines identification by saying that "a person identifies himself with a group when, in making a decision, he evaluates the several alternatives of choice in terms of their consequences to the specified group." The phenomenon, which is not intentional, results in stronger loyalty by individuals to small units—departments, 4-H, etc.—than to the total Extension program. Scheel lists evidences of identification that are readily recognizable in most Extension Services as an emotional desire to advance a specialized phase of work with which identified, an emotional response to protect the specialized phase of work against attack or criticism, a friendly attitude toward members of the specialized group, a suspicious or hostile attitude toward non-members, resistance to extending own efforts outside the group, resistance to receiving advice or assistance from certain outgroups, categorizing authority as legitimate or illegitimate, according to its group identification significance, and a tendency to make decisions on the basis of their consequences for the group with which identified, if the interests of that group are involved.

[1] The author has drawn liberally in this section and the next on ideas presented by Jean Scheel in his Master's thesis presented to the University of Chicago in 1954, entitled, *The Problem of Integration in a State Extension Service.*

The two reasons mentioned are quite strong and must be recognized. Neither resistance to change or identification is intentional. They are part of human nature, and must be recognized within this framework.

How to achieve an integrated program

There is no single, simple step that can be taken to secure an integrated program. A combination of measures over a period of time appears necessary. Several possibilities that have worked are discussed briefly in the paragraphs that follow.

a. *Study the problem.* Bring the problem of integration into the open for frank discussion by the staff. One purpose of this step is to familiarize staff members with the phenomenon of identification. This approach also enlists the initiative of staff members in devising solutions, rather than depending upon pressure from the top to accomplish the necessary changes.

Part of the staff study should indicate the extent to which there is presently an integrated program, and provide situations where the staff can identify conflicts which will help indicate the need for an integrated program. Extension has learned in working with people that the best way to develop a change in attitude is involvement. Extension personnel are human, and follow the same motivations as the people we are attempting to educate.

b. *Develop objectives.* The staff should develop definite objectives for the problem area, in this case agricultural adjustment. This is a most difficult step. The major difficulty will not be getting agreement among staff members, with different backgrounds and interests, but getting an understanding and statement of objectives. Extension programs have been criticized by many because of their lack of specific and obtainable objectives. All too often Extension workers state their objectives either in what amounts to platitudes, or in activities, such as holding x number of meetings, y number of demonstrations, etc. The objectives need to be specific and measurable. We must be able to determine whether an objective has been achieved. While there will undoubtedly be some differences of opinion as to what the objectives should be, somewhat limited experience in attempting integrated programs leads me to the conclusion that agreement on what an objective is, and statement of an objective, is a more difficult problem.

The development of objectives cannot be achieved at a single meeting. Background on what is meant by an objective for Extension must be developed. This might be achieved by having each Extension worker list objectives for his particular area of work. A study of objectives prepared by national task forces and other states will be helpful to the staff in developing definite, specific objectives. The Scope effort, in which Exten-

sion is currently involved, is an excellent tool for helping the staff develop some specific objectives for one or several problem areas.

One of the problems Extension always faces is the mechanics of involving the total staff, not to mention the advisory groups. It will probably be necessary to start with the state staff, letting them develop what might be called tentative objectives. The county workers can then be involved in districts or sub-districts, giving them a chance to react to and modify the objectives developed by the state staff. The county staffs can follow the same process with the advisory groups. A procedure for feeding back reactions and suggestions can be developed. Either administration or the specialists can be assigned the responsibility of compositing judgments and developing a final statement of objectives which is given to the total staff and the advisory groups. Experience has indicated that the county staffs and advisory groups are not likely to make many changes in a set of objectives carefully developed by the state staff and minor modifications are relatively unimportant. The process of involvement, however, is necessary to the acceptance of these objectives by the total staff.

c. *Try new programs or give a new front to an old program.* Because of long-standing loyalties, it may be impossible to develop an integrated program on an old problem area. The problem area for which an integrated program is to be developed should be broad and obviously require the efforts of a number of people. The adjustment problem of agriculture is a good example of a broad problem, new to many people, that requires an integrated effort. Practicing integration on new programs makes integration easier on old programs and helps break habits and identifications. Many writers could be cited in support of this recommendation. John Dewey, for example, stated that "the basic characteristic of habit is that every experience enacted and undergone modifies the one who acts and undergoes. This modification affects, whether we wish it or not, the quality of subsequent experiences."

Integrated programs can be facilitated and encouraged by integration in some of the routine operating procedures, such as plans of work and annual reports.

d. *Make feasible staff shifts.* Shifting of responsibilities will help break old identifications, and if the shifts and responsibilities make sense within themselves, will develop morale conditions conducive to developing integrated programs. It is recognized that few shifts can be made at the specialist level in primary responsibility, but some sort of shift is possible for most people. For example, in my own state farm management specialists are assigned to a particular geographic area. Shifting responsibility from one geographic area to another could be readily achieved and might provide good stimulation, as well as break old identifications for these in-

dividuals. Some of the routine, overhead jobs, such as preparation of news letters, preparation of annual reports, etc., which are not primary responsibilities of a particular specialist, might be rotated between members of a particular department. Even such small changes can have far-reaching effect on attitudes and morale. There are considerable opportunities for shifting assignments at the county level. Few counties have sufficient personnel to assign each job to a particular individual. Further, the trainings of many county staffs are fairly homogeneous. Work assignments are somewhat arbitrary. Significant shifts in responsibility could be made in many county staffs without in any way weakening the quality of information disseminated, and many worthwhile benefits would accrue.

Every Extension Service has many committees. Change the composition of the committees annually.

e. *Relate the decision-making process to the objectives.* When several groups which have different identifications are involved, responsibility for the final decision should rest with someone responsible for all groups, or none of them. If a particular Extension Service uses committees for making policy decisions, then the chairman, when decisions on program integration are being made, should be a person who is not identified with any of the groups working toward an integrated program.

In my opinion, administration must take the lead in achieving integrated programs. Integrated programs will not automatically be evolved. The committee system, which often results in compromised suggestions, is generally ineffective in developing integrated programs. In many states, administration is understaffed to take on developing integrated programs in addition to the many other necessary functions. The number of administrative personnel in most Extension Services has not kept pace with the increase in staff numbers and the complexity of the situation. Several states are thinking of developing a middle management, who will have the exclusive responsibility of program development and execution. There is some thought of appointing a program leader for each of the major program areas.

f. *Improve communications.* Two types of communications with the staff are needed. The total staff must know of efforts to develop integrated programs. The objectives that are developed for a particular program area need to be kept before the staff in writing and at meetings. While we might become bored with repetition, it is necessary for getting acceptance by a majority of the people. Keep the total staff informed of contributions of individuals and groups within Extension toward achievement of the common objectives. When the staff finds that recognition and praise are going to those who do work toward the objectives of the integrated program, they will be more interested in the common objectives.

A second type of communication should broaden identifications. Make material prepared by one department available to other departments, and make material on a particular program available to those interested in other programs. The greatest practical handicap to the use of communications for broadening identifications is the already large volume of mail that the individual Extension worker is expected to read daily. The pressure of practical requirements necessarily means that a considerable amount of this mail is hastily consigned to the wastebasket after only scant attention by the recipient. This means there must be limits to the use of this device. In the final analysis, however, it is probably better to waste some paper than to fail to communicate.

g. *Use committees.* All of us are committeed to death. Some device for pooling knowledge and judgment is necessary, if we are to achieve integrated programs, and the committee is probably the best device. Several safeguards must be observed in the use of committees. The committee should understand whether it is serving in an advisory or administrative role. Most committees serve in an advisory role, although there are exceptions, such as committees for allocating publication funds. When the committee is used primarily as a device to secure program integration, all groups which are being integrated in a particular effort must be represented. In the charge to the committee, however, achievement of common objectives, rather than representation of their group, should be stressed. Most committees should have a specific assignment and be disbanded when the assignment is completed. When continuing committees are used, their membership should be rotated on an annual basis.

h. *Locate and use "natural" leaders.* Some of the most influential persons on any Extension staff are in neither administrative or supervisory roles. There are people who, because of their knowledge, experience, personality and methods of operation, have large groups of Extension workers looking to them for guidance. These people can be located. If these leaders can be sold on the objective of developing integrated programs, many of the barriers will be automatically overcome.

i. *Broaden identification of lay leaders.* Many lay leaders who serve officially and unofficially as advisors to Extension are strongly identified with one group or traditional program. Lay leaders often have even stronger identifications than Extension staff members. Lay leaders can be either a barrier or a help to Extension's objective of achieving an integrated program. Many of the techniques suggested for changing or broadening identification of staff members can be used with lay leaders.

An Extension Service which plans to seriously undertake developing integrated programs should, as a first step, examine the structures, policies and operating procedures of the advisory groups. A reorganization of advisory groups, designed to break or broaden old identifications,

may be highly desirable before efforts to develop an integrated program are started. Such a move will be necessary where the structure and procedure followed to date have developed strong identifications which are likely to be in conflict with the objectives of an integrated program.

j. *Hold meetings regularly of people in all or several groups or programs.* Meetings or conferences of different groups of people who must be involved in a single program on a regular basis help destroy some of the barriers to an integrated program. Weekly staff conferences of all personnel in a county are highly desirable. The staff conferences should help develop an appreciation for the total program and make it possible to give assignments which will help achieve an integrated program. Monthly staff conferences of state staff members, which give a cross section of the staff an opportunity to appear on the program and participate in discussion, are also helpful devices.

k. *Coordinate training with program objectives.* One of the serious weaknesses of Extension has been not providing sufficient training for the jobs the personnel are expected to accomplish. The assumption is often made that a college degree and some experience with Extension qualify a person for any job in Extension. We also assume that great competence in a particular subject matter field makes a person able to take on many assignments. Every time a person is given a new assignment, some orientation and training are necessary. Even if we do no more than ask a person to serve as chairman of a committee, time should be taken to thoroughly brief the person on the mission of the committee and discuss with the person operating procedures.

In-service training programs should be tied to the objectives. Every person in this room understands what is meant by agricultural adjustment. I believe that every Extension worker has heard the term, but the majority of the staff in most of the states cannot describe in writing the agricultural adjustment problems of the day. If we expect the staff to accomplish the objective of solving the agricultural adjustment problem, the staff must be given intensive training on the nature of the problem, some alternative solutions, who needs to be taught this information and how it can be taught. We need to recognize that training is not accomplished in a single shot. There must be meetings, material prepared and studied and follow-up visits by specialists and supervisors.

Induction training for new Extension workers is extremely important, as first impressions often become lasting impressions. If an Extension Service is seriously attempting to develop integrated programs, this policy should be made clear and palatable to new Extension workers.

1. *Use specialist influence.* Specialists who are armed with the authority of ideas often have more real authority than supervisors. This authority should be used to achieve an integrated program with the county staff.

Specialists often have stronger identifications than county workers. There are more opportunities for administration to change their identifications, however. If the specialists are to be a major arm in securing an integrated program, administration must devote sufficient effort to being sure they are sold on the idea.

m. *Administration must play a major role.* It should be clear by this time that administration has a major role to play in achieving integrated programs. I believe it is not too strong a statement to say that integrated programs are impossible without administrative support and action. Administration must first set a policy of having integrated programs and then use every device available for achieving the policy. Administration should provide positive leadership in arranging situations whereby identifications can be broadened and common objectives developed and achieved. The administrative devices of evaluation, the budget, plans of work, annual reports and others can be effective tools for helping develop and execute integrated programs.

Conclusion

Extension workers are faced with unparalleled opportunities. There is an increasing appreciation of the importance of and difficulty of informal education. There is an increasing appreciation of the role of education in our society. There are many new tools available to the Extension worker. One of the real barriers to Extension's grasping the many opportunities is unintegrated programs. Integrated Extension programs can be developed by no one except Extension workers. One of the real challenges and opportunities for service is the development of integrated Extension programs around the pressing problem areas faced by individuals and society today.

DEVELOPING AN INTEGRATED EXTENSION PROGRAM ON AGRICULTURAL ADJUSTMENT PROBLEMS— THE PRODUCTION VIEWPOINT

JOHN O. DUNBAR
Purdue University

MY assignment for this paper was to explore specific ideas relating to the development of an integrated extension program for agricultural adjustment from the production viewpoint, not to discuss Dean Ratchford's paper. To do this I have broken my analysis into (1) the demand for a shift in extension emphasis, and (2) suggestions for building an integrated extension program for agricultural adjustment.

Demand for a shift in extension emphasis

Everyone knows that so much technology and capital have been poured into agriculture to increase production during the past decade and a half that surpluses have been built up and prices and incomes have fallen. Movement of labor out of farming has taken place rapidly, but not rapidly enough. Land use shifts have taken place too, but not rapidly enough. Result—the people left in agriculture have unsatisfactorily low incomes. This creates problems for farmers—but it in turn creates some serious problems for us in extension.

Farmers are no longer in a mood to accept the answers we gave them in the 1950's such as: "What you need is more volume, so apply more technology and capital"; "Farm more intensively"; "You've got to run to keep ahead of your neighbors"; or "Either get bigger or get out." Now they want to know "Where do we go from here?" "What do we do for economic survival?" They are saying "Get off those horses you have been riding, and help us get out of the fix we're in." In short, they are telling us what we have been telling them; "Either adjust or die." And they're neither able nor willing to wait long for answers. They want to know what to do *now* to keep alive economically in the *next 3 to 5 years,* not just how to pour more technology and capital into their business.

Thus, all members of the extension service, and particularly economists, are being called upon to place more emphasis on the various phases of adjustment which will help individual farmers make or save more money in the days ahead. No adjustment is going to take place in farming until some farmer makes a move. Therefore, if we are going to help them bring about the necessary adjustments, we have to focus our attention on the problems they face in 1961, 1962, and 1963, not in 1970 and 1975.

In general, the adjustments we need to help them bring about come under three basic categories: (1) reducing total resources in agriculture to help bring supply into balance with demand, (2) adjusting the size of farm producing units to best use modern technology, and (3) improving the resource mix of individual farms. However, the questions they are asking us are much more specific than this. First, they want to know what is the overall outlook for farming in general. Second, they want to know what will be their individual competitive position in farming. Knowing these two things will help them decide whether to get in or stay out of farming; or, if they're already in, whether or not to stay. Third, once they've decided these things, they want to know what to do to maintain or improve their competitive position.

Here are some specific questions farmers are asking wherever you go in the United States:

(1) What kind of an economic environment are we going to have to operate in during the next few years? They continue to be interested in

outlook information on general price levels and seasonal and cyclical price variation of commodity prices. But now, with their capital reserves low—some of them are actually living off their inventories—they want to know what is going to happen to overall agricultural production, demand, markets, prices, incomes, farm programs, and land prices. How are changes in other parts of the country going to affect them? An appraisal of these things is extremely important for a man who is thinking about putting $3,000 into a new farrowing house, $20-30,000 into a cattle feeding set-up or $80,000 into land.

(2) How much capital and land do I have to have to start farming?

(3) What earnings can I expect from agriculture over the next 3, 5, 10, or 20 years? Many good young men who have already started farming are seriously considering getting out of agriculture while they can. Others, who haven't started, are skeptical.

(4) How big do I have to get to stay in farming? Do I need more land? Or should I invest in a bigger livestock operation to get needed volume?

(5) Should I concentrate more on volume of business or pull back a little and concentrate more on efficiency of production? Actually some farmers in Indiana are now saying, "I believe I may have a few too many acres to do the kind of production job necessary to compete."

(6) What's the best combination of enterprises for my farm in light of today's technology? For example, do new technologies in crop production make it profitable to grow continuous corn, or is some legume still needed in the rotation? Does livestock fit into my farm organization? If so, what kind and how many? How big does each enterprise have to be in order to get most of the advantages of size?

(7) How specialized do I have to be? On a livestock farm, should I process my own feed or have it done at the elevator? On a grain farm, should I continue to store corn on the farm, or are the economies of large-scale commercial drying and storage such that it would pay me to sell directly out of the field? Should I raise my own feeder pigs or buy them?

(8) Which system of production fits best for the type of enterprises I have? In the hog business, for example, is it better to have a specialized central farrowing house, nursing barn and feeding facilities; or portable housing for farrowing and nursing with a feeding floor for finishing? Also, is a complete confinement system better than one which puts the pigs on pasture for part of their life?

(9) Which type of building or machine fits best into my system of production? For example, should I use a stack, trench, bunker, steel, glass-lined, or concrete-stave silo? Should I use a corn picker with a sheller attachment, or a picker sheller, or a corn combine?

(10) How much can I afford to invest in intensity? Should I invest in push buttons and automation in order to increase my labor productivity

or should I stay with the more conventional mechanical system?

(11) How much capital reserves should I keep?

(12) Would it be profitable to change the ownership form on our farm to a partnership or a corporation?

(13) What's the best kind of leasing or contractual arrangement? Changes in equipment investment are making it necessary to change leasing agreements. Contract feeding of cattle, broiler raising, and production of eggs are giving rise to all kinds of questions along this line.

(14) What can I as an individual do to get my supply and marketing facilities so structured that I can get the economies of buying and selling that are essential to me if I'm to be able to compete successfully? This category of questions includes problems of getting service, of which extension assistance is one.

Suggestions for building an integrated extension program for agricultural adjustment

This urgent demand to increase our emphasis on adjustment problems has come right at the time when numerous other sweeping changes are putting on pressure for improvement of our extension organization and staff. First, there is the increasing complexity of our research data as more and more researchers dig into more and more phases of nutrition, breeding, environmental control, engineering, production practices, functional costs, enterprise costs and returns, etc. Second is the changing nature of farming as the technology for producing each enterprise grows more complex, as we substitute more capital for labor, and as the farm becomes more specialized. Third is the changing nature of the county agent's job. Time was when the county agent's activities for a month consisted of 13 hen culling demonstrations and helping 4 farmers with their record books. Today, he is organizer and coordinator of almost everything in the county connected with agriculture and sometimes things that are not. Tomorrow, we're thinking of expanding his activities to include organization of other University Adult Education Programs in the county. Fourth is the changing number and nature of farm supply and processing agencies which, in turn, in order to sell their product or get what they want produced, "help" the farmer with *all* his problems.

One thing which slows down the adjustment of the extension organization to these changing conditions is the federal-state-county and university institutional framework within which it must operate. Another is the fixed nature of the age, training and experience of the personnel working within the institution.

Dean Ratchford says, on the one hand, that extension isn't going to move forward until we clear paths administratively and make some new paths organizationwise. I agree with this, particularly with reference to

the wide gap which has grown up between extension and the specialized farmer, (1) as the county agent has been drawn away into a different type of functions, (2) as the university specialist has tried to continue covering the waterfront, and (3) as more and more research has been aimed at "improving the profession." I agree that improved administration and organization will help tremendously. But the Dean also says that he believes we'll have to rely on individual initiative and enterprise in extension to bring about a great deal of the necessary adjustment in farming. With this I agree even more. If you and I wait for a big change in administrative organization and these other related phases of our system before we start aiming our guns at our agricultural adjustment problems, our extension ship will surely sink.

With this in mind, therefore, let us list some of the things we as individuals can do to get our extension ship out of dry dock and the job of adjustment on the road:

(1) Realize that in the world as it is today we can not be specialists in everything and still be competitive any more than a farmer can. So we have to look at the overall job to be done in our field, decide what area to specialize in, and then plow ahead one job at a time. This gives us our little spot in the sun and helps us maintain some measure of personal pride and prestige.

(2) Take the bull by the horns in developing a program. This means that we have to study and discuss the situation confronting our clientele, to determine "what's itching them." Better still, we should be anticipating what's going to itch them in a year or two or three. Then we need to gear our program to this situation—not continually go around "putting out brush fires." I should add that to determine what a farmer's problems are, we have to get in close contact with what's going on in his mind. And we can't do that by talking to each other. We have to work with a substantial number of farmers on their problems right in their own barnlots.

(3) Decide if the problem which is itching farmers is one on which we are competent to help him. Let me digress just a moment to say that I do not expect production specialists to become competent leaders in economic phases of the agricultural adjustment education program. Their training and experience doesn't permit it. However, I do believe it's absolutely necessary that they should understand what the adjustment problem is and what causes it so they'll be able to diagnose farmers' problems better; so they won't be advocating a big capital outlay where none is needed. For example, in our cash grain areas in Indiana, with commercial corn drying and large-scale storage facilities, and current discounts for moisture, we have worked out that it doesn't pay a farmer to build additional on-farm corn storage facilities unless he is a very large-scale operator. Our agricultural engineer who works with us on corn han-

dling and storage problems recognizes this and calls farmers' attention to it when he sees this situation confronting one of them.

(4) In developing information for farmers concerning adjustment problems, range as far into published material and personal experience as is necessary to bring to bear the best knowledge there is.

Take, for example, the development of information on swine production systems. During the 1950's we had big break-throughs on many technological fronts in producing hogs. Our farms were becoming more specialized. Enterprises were becoming larger. Farmers began asking all sorts of questions. People began making all kinds of speculations about complete confinement hog systems, the hog business moving South, meat-type hog production, and many more. Everybody, including researchers in nutrition, breeding, production practices, climate control, farm organization, enterprise costs and returns, and marketing; feed and mineral salesmen; packers; commission firms; veterinarians, and extension specialists in hog production, agricultural engineering, agricultural economics, and veterinary science, was working on some phase of the problem. It was possible for us to get a coordinated set of information which was useful to farmers only by getting most of the university extension people concerned with this problem into a big team. Research men were asked to sit in too! The whole project was coordinated through research and extension administration. Then the necessary knowledge was brought together in a manual.

Out of this experience and around this manual, we built an "integrated" extension program for hog farmers. Each of the extension men concerned participated in this "integrated" program for a while. We called it the ID (interdepartmental) approach. We've used it for developing information on grain handling and beef cattle and dairy production, too.

But this approach was not the final answer to our prayers. We blanketed the state with ID meetings for a couple of years. When prices fell, hog farmers' interest dropped. The swine specialist developed a technical school for hog raisers. So this year, instead of emphasizing hog production systems, we're going to have to concentrate more on some other phase of the adjustment problem.

(5) Spend some time educating groups of feed salesmen, elevator operators, and others who work daily with farmers about these adjustments. Many farmers get a lot of information, and a lot of misinformation, from them. Remember, there are a lot more feed salesmen than there are of us.

(6) In disseminating information, pick the educational method which will bring about the educational change we desire. One thing which I think many of us need to stress more and more is gearing our information to the needs of a particular group, then assemble this group from as

broad an area as necessary to have a successful meeting. If the information is designed for a group of specialized hog farmers, it may be that there are enough for a meeting in one county. If it's for specialized cattle feeders, it may be necessary to bring them in from several counties. Modern transportation and communication have changed the way we can do things; so why not take advantage of them in our work much the same way as we suggest for farmers.

(7) Lastly, as individuals, many of us need to be good neighbors; that is, play on the other fellow's team now and then. One of the greatest satisfactions in extension work is to participate in a successful group effort. With group effort, we can both check each other's work before it gets the acid test in the field and also get things done more timely.

In conclusion, it seems to me that the current urgent demand for extension to develop an integrated program on problems of agricultural adjustment, from the marketing and public policy standpoint, as well as from the production standpoint, is in reality more evidence of a growing demand for an expanded extension service than a fundamental criticism of what we are doing. It indicates that farmers appreciate what we've done to help them with their problems in the past and are now asking us to help them with their adjustment problems. In fact, they say, "If we can't depend on you to help us, to whom are we going to go?" We can successfully meet this additional challenge if we are able to get a clear picture of the farmers' problems and create a better organized, trained, equipped, and coordinated extension team. To do this everyone of us in extension will have to set our sights ahead of the changes that are going on around us and improve our ability to not only help farmers solve their problems, but to help them figure out what they are.

DEVELOPING AN INTEGRATED EXTENSION PROGRAM ON AGRICULTURAL ADJUSTMENT PROBLEMS— THE MARKETING VIEWPOINT

D. UPTON LIVERMORE
Virginia Polytechnic Institute

AS I understand my assignment, I am expected to deal with the marketing aspects of an integrated Extension program and try to supplement rather than discuss Dean Ratchford's paper. I think he has done a fine job in presenting the broad framework of the problems and principles involved. For our purpose here, I shall accept his definition of adjustments, and his statement of need for an integrated Extension program.

The process of integration is one of unification; to present the sum or

total. I think I would like to emphasize another term—that of coordination. Coordination is a process of bringing into common action, a process of harmonizing. I shall try to illustrate, in the field of research, the distinction between these two terms. There came to my attention recently a very fine piece of research on the physical effect of pasture irrigation on beef output. Nowhere in the publication was any reference made to price-cost relationships, nor to marginal analysis. Now if the efforts of the economist, engineer, agronomist, and animal science researchers, and perhaps still others, had been *coordinated* when this study was undertaken, it could have resulted in an *integrated,* or unified, set of results, As it is, the study is incomplete in the sense that rational farm adjustment becomes difficult when economic choice indicators are omitted. Many similar instances in both research and Extension can be found merely by reference to the literature of both agencies.

Lack of a desirable degree of coordination of effort, and failure to develop and present integrated educational programs are deficiencies that have been with us a long time. A considerable lack of coordination exists among specialists within departments, among departments, among divisions, and among agencies. Each has been given or assumes a high degree of autonomy. Each specialist is apt to sell his own "wares" quite independent of the implications for other aspects of the problem or for the objective of the total program. (This is like building a house and asking the plumber, the mason, and the carpenter to each specify how much of his wares will be used and where to put them.) The result is often a barrage of 5-minute radio tapes and 2-paragraph press releases issued with the assumption that somehow the intended clientele will put this jig-saw puzzle together and be able to act upon it. One such press release the other day said that a 5 per cent to 8 per cent commodity surplus is no problem, that it represented a relatively good adjustment to demand, and that we ought to be bragging about it, not moaning about it. There was little amplification or qualification of this pronouncement. It is not my purpose here to quarrel with the statement, but merely to illustrate what I mean by autonomy of the specialist.

In our approach to on-the-farm problems, we have relied primarily upon the county agent as a coordinator of the efforts of the college specialists and as integrator of subject-matter programs. The county agent has been the one who supposedly brings together at the county level the entomologist, the engineer, the economist, the dairy scientist, the animal husbandman, the agronomist, etc. These many specialists and their respective talents and programs have in this way been brought to bear on the multifaceted problems of on-the-farm production. This is not to suggest that a perfect job has been done, but at least a reasonably good

means of doing it exists in terms of organizational structure. To some degree, the county agent has sought to do this with marketing problems, but here his efforts have been quite limited, and efforts by marketing specialists to work mainly through and with the county agent have led to considerable frustration and lack of accomplishment. There are a number of reasons why the approach to education in marketing through the county agent is ineffective:

(1) County lines mean little in marketing. Even state lines mean little. The only claim to distinction possessed by many county lines lies somewhere in the dim past.

(2) There are enough, and more, problems in farm production adjustments and technology to occupy the county agent. If he does that job well, he has his hands full. In some ways, he has fallen behind through no particular fault of his own, and nowdays he has many educational competitors with resources for specialization far greater than his own.

(3) The county agent "identifies" with farmers, and is so identified. The highly specialized processing and marketing firms think of him as the man to help them insofar as they have problems of farm production in terms of varieties, breeds, production of quality, etc., but they do not look to him as a source of help in solving the problems of technology and management in their own plant or industry. They respect him for what he is, a capable, hard working, farm oriented leader and educator; a man they want to know and work with on the procurement side of their business (on the sales side if it is a supply firm).

(4) The county agent believes firmly that helping the farmer make more profit is a righteous course of action—but as yet he probably does not have quite the same conviction about the meat packer, the feed miller, the tobacco company, the textile mill, or the peanut miller.

(5) The belief in a local market for local produce has not proved to be a universal answer. This was something the county agent could work on along with the local Chamber of Commerce. There are quite a few "monuments" around in fond remembrance of efforts to develop a local market. On the other hand, there are some commodities that do seem to lend themselves to local assembly and sale, and county agents have been helpful to farmers in organizing (and in some cases operating) these functions. I refer to wool pools and specialized types of livestock sales, and a few small produce marketing cooperatives. But marketing goes far beyond this and leaves the county agent about where he's always been—identified with the farmers' interest, and the farmers' problems.

Now this is not intended to be criticism of the county agent. What I am saying is that the prevalent philosophy of the Extension Service, which says that the function (raison d'être) of the specialist is to help the

county agent, will have to be revised insofar as marketing is concerned if the Extension specialist is going to work with the people who do the marketing job. It is not going to be possible for Extension Service to do effective work with marketing firms by exactly the same methods and with exactly the same organizational approach that it uses to do effective work with farmers.

Many of the Extension specialists are competent, or can become competent given time, to provide effective assistance to marketing firms. But a marketing firm in its objectives and its role in society is not greatly different from a farm. It is in business to render a service and make a profit doing it, the same as the farmer is farming to produce food and make money doing it. It is not wicked for a marketing firm to make a profit and there is no reason why we should shy away from helping a firm accomplish its objective. Competition will take care of the size of the profit. Another similarity is that there are many facets to the business: management, technology, organization, personnel, capital, seasonality, legal problems, facilities, competition, pricing, planning, etc. No one specialist is going to be able to help these firms isolate and solve all kinds of problems, any more than one production specialist is prepared to deal with all these problems on the farm.

What we need and do not have in Extension at the State level is an administrative organization designed to bring to bear on one marketing firm or group of marketing firms the coordinated skills of the specialist staff in much the same manner as the county agent tries to coordinate these skills at the county level in behalf of farm firms in the interests of an integrated educational program at the county level.

Specialists identify with their professions and their departments, as Dean Ratchford has pointed out. I think they should do this. They tend to compete for clientele and professional recognition. I do not regard competition as detrimental among professional people any more than it is detrimental among farmers or businessmen. This assumes that it is the proper competitive spirit that prompts men, agencies, and organizations to do their best in rendering service and derive satisfaction and reward in doing it. Extension has placed some control on this by making the county agent and district agent the coordinator of numerous specialists coming to the county. Specialists must work through the agent. Specialists do not call county meetings, write letters to farmers, or otherwise act independently of the county agent. They look to him to integrate their specialty into the county education program.

In working with marketing or supply firms, however, we have no such provision. I am ruling out the county agent for the most part as an integrator of marketing programs for reasons stated above. There is nothing now to prevent an individual specialist or department from developing

its own clientele quite independent of other specialists or departments, and attempting to be representative of all disciplines involved, wittingly or unwittingly.

On the other hand, there is equally no provision to stimulate specialists or departments into participation in an area where their services are needed since they are largely autonomous in planning their own work and carrying out their plans.

It seems to me that an integrated educational program in marketing can be developed when appropriate administrative action is taken to coordinate the specialists of various departments. Some, but by no means all, of the autonomy of individual specialists and departments will doubtless have to be given up in favor of overall administrative coordination of effort and program building if an integrated program approach is to be made. The marketing specialist is charged with responsibility for working largely with marketing firms, i.e., the people who do the marketing. Generally, the marketing specialist is an economist. Yet, many of the adjustments that firms must make involve problems in technology, problems in law, engineering, finance and accounting, problems in production and psychology—a whole gamut of disciplines beyond the usual province of the economist. In fact, some problems are beyond the province of Extension Service and involve one or more other agencies. Something more than voluntary cooperation among specialists is needed. Cooperation may be prevented or deliberately withheld.

Under the present organizational structure of Extension Service, it seems to me that the Director's office needs to assume the responsibility for coordination of inter-departmental personnel in the development of integrated Extension marketing programs. Dean Ratchford has outlined some good suggestions for doing this. No one specialist or department has authority to do more than ask for voluntary cooperation from other specialists or other departments. Some volunteers may be left out, either deliberately or inadvertently, resulting in programs that are not integrated.

The committee approach is helpful, and should be used, but it lacks the authority and leadership that may be necessary in planning and carrying out an integrated program. Specialists are not likely to "identify" strongly with a committee. I do not believe that sensible administration of such an approach through the Director's office means that everything and everybody needs to be integrated. This might mean the creation of a bottleneck. It does mean that when a problem is isolated that calls for the attention of several disciplines, as would certainly be the case with major adjustments, the Director's office should be prepared upon request, or upon its own initiative , to bring together the necessary specialists and take responsibility for developing and putting into action an integrated

program; not pass the buck back to some committee chairman. If, as Dean Ratchford says, "Extension is morally obligated to supply *all* of the information on a particular problem," then it seems to me that Extension administration has a moral obligation to its collection of specialists to establish policies and operating procedures that will coordinate their work and integrate their programs in problem solving, particularly as the tough problems of adjustments are tackled. I agree with Dean Ratchford that "administration must play a major role in achieving integrated programs," not only in new programs but also the old established programs. Insofar as marketing is concerned, this calls for something new in Extension: new policy, new procedure, new organization. Fundamental to these is the need for a carefully considered philosophy of Extension work as it applies to agriculture as a whole rather than merely as it applies to the vocation of farming.

DEVELOPING AN INTEGRATED EXTENSION PROGRAM ON AGRICULTURAL ADJUSTMENT PROBLEMS—THE PUBLIC POLICY VIEWPOINT

M. D. THOMAS
Oregon State College

I LIKE what Dean Ratchford says in his paper. His ideas square well with beliefs I have come to hold.

When this paper on the public policy viewpoint was requested, it was suggested that contents not be limited to a discussion or re-hash of the main paper. Instead it was suggested that additional ideas should be added as well.

I choose primarily to do the latter, after first briefly echoing a little of what Dean Ratchford has said. I would hasten to add that the "additional ideas" contain little that is new or different. They are more nearly a restatement or re-iteration of thoughts that, from my point of view, need emphasis. They are points that can hardly be re-stated too often until our actions either parallel our notions or until our notions are proven seriously faulty.

What I choose to do is a bit disturbing since the procedure departs so widely from the problem-alternative-consequence approach so widely heralded today. I shall present my views or opinions, based as they are on a mixture of facts, experiences, observations, and personal values. In so doing, I am leaving with others the privilege and the right that we as eduactors can never deny—the right to accept or reject as much or as little as each one likes. With this in mind, my "biased" approach becomes less disconcerting, to me at least.

Now to get to the subject.

Certainly there are problems and there are alternatives for Extension in organizing to work on any problem. The integrated approach is not the easiest way, partly because it is not the usual way. Marshaling Extension's diverse and unique but limited resources, capacities, and talents for a concerted effort on any problem is a sizeable task. The difficulties are not made any smaller when the problem area is as big and broad as agricultural adjustments.

Yet, the very size of adjustment problems does provide an opportunity to try the integrated or "management-oriented" approach.

The opportunities for service and achievement, the possibilities of enhancing the public well-being, the necessity of efficient use of public funds and the magnitude of the problem are all compelling reasons why the integrated approach should be tried. To stay strong and effective in the field of informal education, Extension at the national, state and county levels must constantly strive for the optimum combination of coordinated teamwork and individual freedom in program development and execution. This combination is the prime objective of an integrated program.

These to me are significant points Dean Ratchford has made in his paper. These are beliefs I have come to hold after more than 20 years of observing Extension from the viewpoint of a specialist involved in various phases of one state's project in economic information, including partial responsibility for leadership of some phases of public affairs education.

Once objectives of a program have been agreed upon, development of an effective integrated educational effort will rest heavily on the full understanding by all participants not only of the initial direct consequences but the secondary indirect impacts of the participants' actions as well. Helping to create this understanding among their fellow educators can be a major contribution of extension economists whether their specialty is farm management, marketing, or public affairs.

Until this understanding is achieved, essential administrative support will be lacking and the full complementary effort of other specialists and staff workers will not be forthcoming. Likewise, county staffs will not see the real point and purpose of their work and will not devote full energy to the program. In other words, less than full understanding means less than maximum efficiency and achievement.

For an effective integrated Extension program on agricultural adjustment problems, extension workers and their counterparts in research and teaching will need to understand the real nature and causes of farmers' difficulties. They need to understand the differential effects of new technology on the economic well-being of early adopters, late adopters, and

consumers. They need to understand why returns to manpower used on farms are low compared to returns elsewhere in the economy; how an abundance of food and fiber makes it possible for more to work at the jobs of producing wanted comforts and conveniences; how farm people freed (or forced) from farming can find and qualify for off-farm opportunities; and why there is a full-sized commercial farm for not more than one out of every 10 boys growing up on farms today.

These understandings, and therefore effective programs, are not likely to be fully achieved until Extension and other divisions of our land-grant colleges devote more time and energy, especially brainpower, to this effort. The number of people attempting to identify and evaluate consequences of change and of various alternatives is small compared to the number that are attempting to justify, support, or defend some particular project, procedure or policy. So long as this is true, the needed understanding and progress toward an enlightened, integrated program on agricultural adjustment will come slowly. It might not come at all if it were not for the leadership and resources of such organizations as the Farm Foundation and the Iowa Center for Agricultural and Economic Adjustment.

Such understandings will do much to eliminate the "dog-in-the-manger" attitude to which Dean Ratchford refers. These understandings are important to effective teamwork. This is true even though the roles of individual staff members will vary widely. They can mean the difference between a negative and a passive response, or between passive acceptance and active support. This is important even though Extension workers trained primarily in technology are likely to continue to make their main contributions in the areas of production and marketing efficiency rather than in the areas of broad understanding of the causes and results of social and economic change or on ways of managing this change to minimize the pains and maximize the gains to individuals and society as a whole.

The burden of the latter effort seems quite likely to rest on those trained in the social and behavioral sciences. In their efforts they can be greatly assisted by those skilled in using mass media. Here is a place where there is opportunity for outstanding Extension accomplishments through integrated effort, it seems to me. I refer specifically to the possibility of close alignments of the efforts of specialists in economics with those informed on mass communications techniques and with access to mass media outlets.

One rather elaborate method of bringing Extension's limited but unique resources to bear on educational needs related to social and economic change, including agricultural adjustment, was outlined recently in a document distributed by the Iowa Center for Agricultural and Eco-

nomic Adjustment. This description of a "Possible Role for Cooperative Extension in relation to Agricultural Adjustment and the Changing American Society" is based on discussions between extension administrators and specialists from a few states, representatives of the Iowa Center, and resource people with Educational Research Associates.

The proposed method embodies self-administered discussion groups and carefully prepared discussion materials. It provides for an extensive umbrella of mass media coverage to create an attractive and favorable climate for the discussion group activity. It also permits county participation at varying levels of intensity under what is termed an "infinite-option" system.

This method is one way Extension can organize "to foster a level and breadth of public understanding within which constructive public action on agricultural adjustment can take place." It involves a measure of integration, certainly of Extension's capacity to organize people, develop subject-matter and disseminate information. Programs generated by this proposal warrant close study and evaluation by state staff everywhere.

A much less elaborate approach can involve close working relationships and integrated efforts of the economic and information specialists. Economists, working in the area of public affairs or outlook who are not working closely with specialists in radio, television, publications and news media are definitely missing a bet. Information specialists generally recognize the wide audience interest in economic information and are ready to assist a reasonably cooperative specialist package and present his message. This does not substitute for the traditional group meetings but does help to get additional mileage out of materials and thoughts developed for more limited audiences.

Perhaps before Extension can be fully effective in the area of agricultural and economic adjustment, ways will need to be found to gain access to brain power usually not found in extension work, but frequently located elsewhere in land-grant or other educational institutions. This brain power lies in the areas of sociology, economic geography, political science, psychology—especially counselling and guidance—and philosophy.

Undoubtedly there are many ways this access can be obtained. In some instances, it may be possible to employ members of the resident teaching staff between terms or during the summer to assist with material preparation, staff training and the like. Access to such personnel for a period of two or three months may be a feasible substitute where full-time help in these specialized fields is not possible. It can sometimes be financed out of reserves that frequently accumulate in various ways.

Another way is through a major overhaul of an institution's organizational structure for handling off-campus educational programs. This may

or may not involve combining "agricultural" and "general" extension activities. This is the direction in which at least three of our land-grant institutions are currently moving—the ones in Missouri, Michigan and Utah. This is a move that has placed heavy demands and responsibilities on Dean Ratchford's hands during the past year and for the foreseeable future. Since I am only aware of these trends toward consolidation and am by no means fully familiar with them, I shall refrain from further comment, except to say that I seriously doubt that citizens and taxpayers of the states and nation will be fully satisfied with efforts to help them learn to manage social and economic change until fully integrated educational efforts are developed. This may well involve the eventual development of off-campus centers for education—formal and informal, adult and youth—in most of the counties or leading communities. This could be the natural, logical evolvement of county extension offices, if we successfully demonstrate the why's, how's and what's of a fully integrated program on agricultural adjustment or resource development. Certainly an important part of such an off-campus educational center would be to continue to bring the results of research to the people, but the scope of information and teaching would extend well beyond the farm and home technology in which we specialize today. It would go much further into off-farm vocational skills, occupational guidance, citizenship, and intellectual areas. It would still be education for action—action more fully enlightened through a broadly but consciously integrated educational effort still aimed at identifying and satisfying the wants expressed by the people.

One more thought before closing—this paper in itself has created no clear-cut image of an integrated extension educational effort. When coupled with the other three, I doubt that it will do so. At least I personally do not profess to have detail of such a program crystal clear in my viewer. But I am fairly certain of one thing: namely that our educational efforts in the future must give greater consideration to the roles played by women when decisions are being reached. They have great influences where employment and vocational choices are being made. They have as much need as men for an understanding of the forces operating in the world in which their offspring live and work.

Finally, the integrated approach may not be the only approach; but through it, Extension can do much to relieve farm problems and help all the people achieve public policies and programs that will truly let the production and marketing process perform more smoothly.

POTENTIALITIES AND LIMITATIONS OF COMPREHENSIVE SUPPLY CONTROL

CHAIRMAN: WALTER W. WILCOX, LIBRARY OF CONGRESS

SUPPLY CONTROL: IDEAS, IMPLICATIONS, AND MEASURES

G. E. BRANDOW
The Pennsylvania State University

IDEAS about supply control for American agriculture are in some respects old and in other respects new. Sporadic efforts of farmers to control production go back to colonial days, and for more than 25 years acreage controls have been part of national farm policy. Farmers have not been able to administer production for long by their own collective action, and government controls used to date have only diverted land from crop to crop. Such forms of supply control have been tested and found wanting.

More recent ideas about supply control differ widely in concept and degree from the old. Control is considered a permanent government policy, and the problem of restricting total output as well as production of particular products is faced. Corollary programs are proposed to make a feasible total program. Effective control devices, rather than merely palatable ones, are sought. After many years, agriculture is growing to understand what it takes to control supply, and circumstances are forcing a decision as to whether or not to go the control route.

This paper discusses the need for supply control, several questions regarding economic efficiency and income effects, general control methods, value conflicts, and specific means by which effective control might be undertaken. Ideas from many sources are drawn upon. The work of Willard Cochrane in this area[1] has been so comprehensive that his ideas are everywhere involved, whether one agrees with them or not.

Why Supply Control?

During the last seven years of the 1950's, agricultural production persistently ran ahead of commercial market outlets at prevailing prices. Quantities diverted from normal market channels by the Commodity Credit Corporation and other agencies during this period have been estimated at about 6 or 8 per cent of total production.[2] If the large quantities

[1] A summary of Cochrane's views is given in his paper, "Some Further Reflections on Supply Control," *J. Farm Econ.*, 41:697-717, Nov. 1959.

[2] Removals by the Commodity Credit Corporation during the period 1953-56 amounted to 8.3 percent of total farm marketings and home consumption otherwise disposed of.—John F. Stollsteimer, cited in Bonnen, James T., "American Agriculture in 1965," *Policy for Commercial Agriculture: Its Relation to Economic Growth and Stability, panelists' papers*, U. S. Congress, Joint Economic Committee, Nov. 22, 1957, p. 147.

of feed grains and wheat diverted from market by government had been fed to livestock, both crop and livestock prices would have been considerably lower than they were, and net farm income might have fallen one-fourth or more below actual levels.[3]

But would substantially lower support prices—or no supports at all—during the early and middle 1950's have held back the expansion of output enough to permit, say, the net farm income of 1959 to be realized in free markets by the end of the decade? A provable answer cannot be given to this highly important question, but consider the following points:

1. The index of all prices received by farmers fell 17 per cent between 1952 and 1959. The market did supply a partial test of the effects of a lower general level of prices, and a direct comparison of prices and total output yields no evidence of a restrictive influence of price.

2. Man-hours of labor used in farm production declined 27 per cent between 1950 and 1959, but the drag on production resulting from this was minor. Indeed, the departure of some farmers may have increased output by speeding consolidation of farms into better managed and more productive units.

3. Planted crop acreage declined 5.8 per cent between the last five years of the 1940's and 1959,[4] an amount just about equal to the land in the conservation reserve in 1959. Crop acreage has been highly stable; during the years from 1920 to 1959, cropland planted (plus the Soil Bank when in effect) varied no more than 5 per cent from average. Probably crop acreage would have declined less than it did during the 1950's in the absence of government programs.

4. Fertilizer consumption, though rising during the 1950's, remained well below levels where marginal returns generally equalled marginal costs,[5] from the standpoint of the individual producer. From the same standpoint, such innovations as grain sorghum hybrids involved very little extra cost in relation to additional returns. In consequence of past lags in adopting new techniques and of shifts in production functions, declining product prices had little effect, through marginal calculations, in restricting output expansion.

5. Total farm output rose about one-fourth during the 1950's with little change in total inputs. Development of new technology, together with

---

[3] Author's estimate. Walter W. Wilcox has estimated that price support activities accounted for 37 percent of net farm income during the period 1952-56 ("The Farm Policy Dilemma," *J. Farm Econ.*, 40:564, Aug. 1958).

[4] Acreage of 59 crops planted or grown.

[5] D. B. Ibach and R. C. Lindberg estimated that in 1954 the average value of marginal returns to fertilizer on intertilled crops was 3.4 times the price of fertilizer (*The Economic Position of Fertilizer Use in the United States*, Agr. Info. Bull. No. 202, U. S. Dept. Agr., Nov. 1958, p. 8).

rising managerial skill of farmers in putting technology to use, was the principal cause of rising total productivity. Probably most of the new methods farmers adopted in the 1950's would have been superior to the old even if product prices had been, say, 20 per cent lower, but the ability to make the investments often required by new methods would have been much reduced.

The conclusion is that total farm output is almost wholly unresponsive to falling prices when technology is reducing land and labor requirements in agriculture, unless prices go low enough to impair the financial ability of commercial farmers to maintain capital and to purchase supplies from nonfarm sources. If this is correct, there is little prospect for a prosperous agriculture in free markets while land and labor requirements are declining, as has been the case since the Korean War.

The story of the 1950's is likely also to be the story of the 1960's. New technological improvements will continue to come forth, and there are still large lags in the adoption of many of the old. Two well-known studies present a depressing picture of price and income prospects for farming in the early 1960's under conditions approximating a free market. One of these, a study at Iowa,[6] assumed that stocks of feed grains, wheat, and cotton would not be reduced and that foreign-currency sales abroad could continue; but the projected prices for the 1962-63 feeding year were $10.80 per hundredweight for hogs, $11.51 per hundredweight for beef cattle, $.66 per bushel for corn, $.74 per bushel for wheat, and $.21 per pound for cotton. The other study,[7] made at the request of Senator Ellender by USDA and supplemented with net income projections by a group of Land-Grant agricultural economists, was based on more complicated but roughly similar assumptions. Its projected prices for 1965 were $11.20 per hundredweight for hogs, $15.00 per hundredweight for beef cattle, $.80 per bushel for corn, $.90 per bushel for wheat, and $.25 per pound for cotton. Net farm income would decline by nearly 40 per cent from the 1955-57 average. Total farm output was projected to rise by 10 per cent between 1959 and 1965 despite a 20 per cent decline in the index of prices received by farmers.

Demands for most farm products at the farm level of marketing are highly inelastic, with the result that additional free market supplies on the order of 6 to 8 per cent would cause net income to fall sharply. The same inelasticity of demand means that the opportunity exists for improving

[6] Paulsen, Arnold; Kaldor, Don; and Shepherd, Geoffrey; *Projections for the Feed-Livestock Economy 1959 to 1963 with Free Prices and No Controls*, Iowa State Univ., Gen. Econ. 154, Dec. 1, 1959.

[7] *Report from the United States Department of Agriculture and a Statement from the Land Grant Colleges IRM-1 Advisory Committee on Farm Price and Income Projections 1960-65*, Senate Doc. No. 77, 86th Cong., 2d Sess., Jan. 20, 1960.

farm income by reducing market supply. The assertion that farm level demands are elastic in the long run though severly inelastic over one year's time is sometimes made in contradiction of this view, but a supportable case for such extreme differences in elasticity can be made only in special cases.

What agriculture has come to call its poor public relations will continue as long as Treasury expenditures for agriculture remain high and large surpluses are on hand. Successful supply control, by routing income to farmers through the market and halting the build-up of stocks, would eliminate these major objections to present programs.

Though supply control seems to follow logically from the main elements of the commercial farm problem, alternate approaches should be examined also. This simply is not possible in the space available here, however; only a general position can be indicated. Any effective alternative to supply control must involve high Treasury costs and strong governmental influences on incomes of particular classes of producers. The possibility that low-cost methods not requiring government intervention will hold farm income even at present levels in remote.

Supply Control as a System for Organizing Resources in Agriculture

In the total economy of which agriculture is a part, various forms of privately administered supply control permeate markets. In much of industry, prices are established on the basis of standard costs adjusted, perhaps, by a fuzzy judgment factor; and though sellers try hard to push sales, they do not typically produce more than they can sell at their asking prices.[8] Some excess capacity is common even in highly prosperous times. Often competition is keen though not textbook perfect competition. Organized labor bargains for its wage, and when the wage is established the employer hires, often subject to certain work rules, as many men as he finds profitable. This is a simple and effective form of supply control. The possibility of a low rate of capital formation and serious unemployment is evident when firms and labor operate in these ways, and a heavy burden is placed upon innovation and other inducements to growth to provide investment opportunities and jobs.

If growth is slow, labor employed in sectors in which labor requirements are falling is in constant difficulty. Agriculture has a dual problem in such a situation. Its surplus workers have more than average trouble in finding remunerative industrial jobs. This point has been made in detail

[8] For an extended description, see Kaplan, A. D. H., Dirlam, Joel B., and Lanzillotti, Robert F., *Pricing in Big Business*, The Brookings Institution, Washington, 1958.

by Hendrix.[9] Also, with no control over price or market supply except by moving resources out, agriculture is a weak player in a game where most of the players are strong. It not only retains resources that other industries would drop, it uses them as fully as contemporary farming methods permit to produce for a chronically overburdened market at unfavorable prices.

Under supply control, agriculture's current tendency to overproduce its markets would be administratively restrained. Market supply would be adjusted so that prices enabled efficient producers to realize earnings deemed comparable, nonmonetary factors considered, with earnings in similar circumstances outside of agriculture. Ideally, controls would be placed on quantities sold rather than on particular inputs, and producers would be free to combine resources as they chose. With land in excess supply, encouragement would be given to extensive methods of production, and by purchasing less fertilizer and other nonfarm inputs, many farmers would be able to retain a larger net income out of a given gross income.

Strong incentives for adjustment of the labor force would exist under supply control, quite possibly as strong, on the whole, as those in a free market. The level of income earned on the farm is not the dominant factor determining whether labor leaves low-income agriculture. If it were, the problem of rural poverty on uneconomic farms would have faded to insignificance long ago. Such matters as education, skills, distance, aspirations, and availability of nonfarm jobs will continue to be the limiting factors even though small income gains are made under supply control.

In commercial agriculture, labor typically does not accumulate on farms just because income may be sufficient for an additional person to subsist. Rather, labor tends to adjust itself to the job to be done under modern farming methods. Where there is need for only one man, a second usually does not stay except during a transitional period, as when a son takes over from his father. The marginal value productivity of labor on commercial farms would be very low, often zero, under supply control. Less family labor might be retained than in a free-market situation, and hired labor would be closely adjusted to requirements under controlled production.

An economic incentive to consolidate farms exists whenever costs per unit of output can be substantially reduced by farm enlargement. This is true whether product prices are high or low. Possibly farm consolidation would be encouraged under supply control by the improved financial position of farmers who wished to expand their operations and by output

[9] Hendrix, William E., "Income Improvement Prospects in Low-Income Areas," *J. Farm Econ.*, 41:1065-75, Dec. 1959.

restrictions on the original farm. Experience with acreage controls on tobacco may seem to contradict this, but experience with wheat controls seems to support it. Probably other variables have been more important in determining trends in farm size in each case.

Quotas are almost necessarily distributed initially among producers on a historical basis. Since the interfarm and interregional adjustment of agricultural output will need to change over time, quotas would be negotiable in an ideal program. Quotas would be worth more to efficient producers than to inefficient ones, and a strong pull would be exerted to shift production accordingly. No producer would surrender his quota involuntarily, however. Since land without quotas would be of little agricultural value, quotas probably would become available rather slowly. Permanent sales of quotas often would represent a decision by the seller to retire his land from farming. Poor land and perhaps labor might leave farming faster this way than in the usual situation where a man who ceases to farm can liquidate his investment only by selling to another man who will farm the same land.

Unless the job of allocating resources in a static sense is thoroughly botched in the future, the most important determinant of total resource productivity in agriculture will be technological advance and managerial ability of farmers. Under supply control, farmers would appraise technology from the standpoint of saving purchased inputs more than in the past. The strong demand for output-increasing technology would slacken in the short run, but there would still be a clear market advantage for the best crop variety, the most efficient tractor, or the most effective means of controlling disease.

The growth of fundamental scientific knowledge upon which technology is based will not be affected by supply control in agriculture. Continued application of science to farming is essential for future domestic and perhaps foreign food needs. Approval of public support for agricultural research may be greater if farmers can manage the production it makes possible than if the uncontrolled impact upon farm prices and income makes technology seem a monster.

A major question about the results of supply control concerns the tendency for income gains to be capitalized into land or certificate values. Entry costs are raised for new farm owners and tenants, and rates of return on farm operators' labor and investment decline from levels initially attained under control. A major purpose of supply control at present, however, is to prevent reduction of farm income, and the case for maintaining the value of farm assets is much stronger than the case for inflating them. Moreover, it seems likely that moderate gains in net farm income achieved by supply control—say, on the order of one-fourth—would have lasting and favorable effects on the farm income situation. As indicated earlier, the

farm labor force might be reduced about as rapidly under supply control as in a free market; hence, per capita farm income would also be improved. Some of the gain would remain as labor income even though much was imputed to the instrument of control. A reasonably good level of income in the agriculture of the future is important even if tomorrow's farmers need more investment to start farming.

The capitalization problem applies to any farm income program and emphasizes the importance of labor mobility if satisfactory incomes are to be realized in agriculture. While mobility is too ponderous a process and too selective of the young to handle adequately the problems confronting agriculture, labor adjustment is an essential complement to successful supply control in the long run.

The distribution of income among farms would not be improved by supply control except as inadequate farms became a smaller fraction of the total. Producers would benefit roughly in proportion to volume of sales, and gains for low-income farmers would be small. Supply control is not a solution to their problems, but neither is it a general obstacle to appropriate solutions.

Ways and Means of Supply Control

When one turns from consideration of supply control in the abstract to ways and means of carrying it out, he finds a number of problems that will limit and modify actual programs. Though comprehensive supply control was tacitly assumed in the previous section and is the practicable goal toward which some advocates of supply control are working, piecemeal supply control will be necessary at the outset and perhaps indefinitely. This results from the favorable economic position of a few commodities, from the especially strong opposition of producers of certain commodities, and from the extreme difficulty of developing feasible methods for still other commodities.

A major question relates to the imposition of controls on the quantity marketed. Well-known problems emerge in feed grains because feeding of grain to livestock on the same farm is very common. One might control all forms of livestock production and forget about feed grains, but this would force all feed grains in excess of controlled livestock requirements on the relatively small food, industrial, and export markets. Cash grain growers, unable to get a share of controlled livestock production, would be in a bad fix.

Compulsory restriction of land devoted to feed grains seems the only feasible means of controlling their production and market supply. Production methods for feed grains are less intensive on the average than would be profitable at current prices, and substantial advances in yields could be expected in a few years. Perhaps land would have to be further

restricted, though voluntary land retirement described later might make this unnecessary.

The problem of diversion of acreage to uncontrolled products arises whether controls are placed on acreage, as proposed for feed grains, or are put on quantities sold, as would be practicable for cotton, tobacco, or soybeans. Land is agriculture's most fixed resource, and the incentive to use diverted acres for some agricultural purpose is very strong on most farms. Virtually one hundred per cent blanketing of farm products with sales restrictions would be required to prevent diversion of land to another farm product. When coverage is less complete, controls on specific crops must provide that acreage of uncontrolled crops will not be increased and that idled acres will not be grazed.

Another problem involving commodity relationships arises when controls are put on one of two or more farm products that represent successive steps in producing a final product. Restrictions on dairy production would reduce in some degree the demand for feed grains. On the other hand, control of grains could raise feed prices and squeeze dairy producers until milk production was adjusted, which would not happen quickly without controls. The only position on this question consistent with supply control is that the ability of producers at one stage of production to adjust output administratively cannot be vitiated by the inability or unwillingness of producers at other stages to do the same. Increased pressures for supply control is put on the other group.[10]

Enforcement of quotas on sales of farm products requires some form of certificate to be transferred at the time of sale. The certificates become a means of assuring buyers that sellers are entitled to sell and of detecting violations among buyers. The key to enforcement is to make buyers wholly unwilling to purchase any products not legally marketed by farmers. The principal penalty invoked against farmers would be the withholding of some or all of the certificates to which they would otherwise be entitled in future marketing years. Similarly, reduction of future acreage allotments would be the principal penalty used when only land was restricted, as for feed grains.

A penalty taking the form of a dollar-and-cent levy for each excess unit marketed or for each excess acre planted reduces the net marginal return from production. If the penalty is heavy enough, expanding production beyond control limits is prohibitively costly. A less severe but sometimes

[10] The same question arises in manufacturing, where neither the steel nor the automobile producers, for example, refrain from cutting production to make things easier for the other group. And it arises between agriculture and industry, for supply control in farming would slightly reduce the average volume of farm products to be processed, would greatly reduce the volume of wheat to be stored, and might reduce the quantity of fertilizer to be manufactured.

more feasible alternative, especially for livestock products, is to sell additional certificates at any time to any producer at prices high enough to deter production when market prices are low. In some cases, it would be possible to simplify administration further by (1) issuing certificates to producers only in quota amounts, (2) requiring buyers to obtain certificates to cover all purchases, and (3) making certificates available to buyers at a price. Then any farmer not having a certificate to cover his sales could sell his product, but buyers would take it only at a price discount representing the price of certificates.

Devices to reduce marginal returns from above-quota production without attempting to prohibit such production entirely seem particularly useful for livestock products for two important reasons. First, these products, including dairy and poultry, are perishable and move to market in a year-round flow. Discontinuities in marketing resulting from attempts to set fixed limits to producers' sales would create havoc for producers, processors and even consumers. Second, livestock products probably would be more responsive to such deterrents than would crops. So long as land has no attractive use other than to produce farm products, moderate penalties on over-quota production will not much influence total crop production.

Sales quotas for a particular marketing year must be negotiable if only for enforcement reasons. Often it will be impossible to prevent neighboring farmers from exchanging a product if one is over his quota and one is under. Permitting this does not increase the total market supply for which quotas were issued. Transfers of quotas among producers, especially producers in different areas, would be useful in averaging out the erratic impact of weather and disease on production without reducing farmers' incentives to prevent crop failure.

Permanent sale of quotas, though desirable in principle, raises certain problems. Full negotiability seems feasible for livestock products once quotas have been in effect long enough so that farmers have a basis for appraising their worth. For crops, however, land controls apparently must accompany sales controls, as already indicated. Negotiability of acreage allotments is not workable because yields vary so much from farm to farm and region to region. If a farmer who sells his sales quota is free to use his land for any purpose, the final effect will be to re-locate production of the controlled crop and to divert all acres taken out of it to other crops. Requiring the land restriction to move with the sales quota would be extremely awkward and would remove most of the incentive for exchange. Thus, permanent sale of crop sales quotas separately from land probably should be permitted only where the seller's land will be retired from agricultural use.

Other types of programs will be required to supplement supply control.

Weather and disease presumably will continue to cause uncontrolled variation in annual production of farm products. Frequently growers will be able to arrange for storage of excess production in years of good yields but this will not always be the case. Probably it would be desirable for the government to offer to take over excess production without payment, store it for the grower at his expense, and sell it (or its equivalent) for his account at a later date under his quota. Storage would also be desirable to assure adequate market supplies in years of short crops. Thus a storage program to stabilize annual supplies would be one adjunct to supply control.

Price stabilization should be purposeful rather than a hoped-for consequence of storage operations. Demands for numerous products at the farm level of marketing are highly inelastic. When a fixed supply under control is set against a highly inelastic demand, the market-clearing price is not sharply defined. Prices may be well above or below the equilibrium level for protracted periods, and wide variations in prices are possible. For storable products, the program probably should establish price at the intended level, engage in storage operations to hold it there, and control producers' production or sales so that storage stocks on the average do not accumulate or disappear.

Supply control or any other program that maintains prices high enough to obtain producers' continuing support probably must provide a means by which wheat and perhaps some other export commodities can continue to be sold in commercial markets abroad. The government might pay substantial export subsidies as it does now for wheat and cotton. If the program were to be self-financing, some sort of two-price plan would be required. Also, of course, import restrictions would be required on controlled products to prevent imports from wrecking supply control efforts. No apology for this is needed when the commodities involved would not be imported under free-market conditions, but a conflict with foreign trade policy may occur in some instances.

Direct supply controls in the form of sales quotas and acreage restrictions would be usefully supplemented by a conservation reserve type of program. Producers putting whole farms in the reserve would be permitted to sell any quotas they had, and this would make the reserve both more attractive to farmers and less costly to the government. The conservation reserve would gradually reduce the land resource at the extensive margin so that direct controls were less restrictive and more easily enforced. Concentration of production on the best land will be necessary if agriculture is to be efficient in the long run.

This review of ways and means of supply control shows it to be much more complicated than simply imposing restrictions on particular products by the most convenient means available and letting the matter rest

there. A properly integrated operation will not be possible if autonomy is given to individual commodity programs. Means are available by which a large measure of supply control can be achieved if it is really desired, but practical limitations will cause actual programs to fall short of the abstract ideal.

Values, Politics, and Administration

Supply control obviously infringes freedom of individual action and involves more government intervention in economic affairs than many people think desirable. Widely shared beliefs and values of farm people on these matters probably make the restrictions involved in supply control less acceptable to farmers than to any other large group. But when faced with a situation in which all goals cannot be attained together—where, in fact, complete achievement of any one goal may not be possible—most people will choose to give up a little satisfaction in one area to gain in another. Since income is important to farm people (as to all other groups in our society), supply control has received increasing attention from farmers and could become widely favored by them.

Supply control must receive widespread support from farmers if it is to succeed. Penalties cannot enforce restrictions unless violations are few and are condemned by local opinion. Typically a producer subject to supply control will be able to increase his income if he can sell more at the same price; farmers must understand the over-all market position and its effect on them if they are to support a program that, from the individual standpoint, may seem to restrict farm earnings.

The income goal in agriculture is often linked with a strong desire to maintain numbers of farms and farmers and to halt the trend toward a commercial agriculture (though still predominantly a family agriculture). In this sense, improved income is regarded as a means of preserving the *status quo* in farming, and some of the support for supply control has come from persons who expect it to do this. But supply control, especially as presented in this paper, is basically a program for commercial agriculture, with little to offer farmers on uneconomic units. It retains incentives for consolidation of too-small farms, continued technical innovation, and emphasis on capital investment. The program is suited to an agriculture rapidly becoming part of an industrial economy in which suppliers of resources administer, within limits, both prices and output. Because supply control need not be wasteful of resources, as some of its critics say it must, it will not preserve the *status quo* in agriculture, as some of its supporters hope it will.

Possibly the politics of administering a supply control program would alter this interpretation, though I doubt it. Pressure to set high minimum quotas and to make room for new entrants can be expected. There have

been indications, however, that such provisions are becoming regarded as encouragements to inefficiency, and quite possibly supply control proposals could not be enacted into law unless they provided that controls would be neutral with respect to farm size.

Supply control is really a complex of related programs that should be administered on consistent principles from commodity to commodity and over time. Experience of recent years indicates a need for a more effective way to develop and carry out any type of farm policy—but supply control especially—in a coherent, flexible manner. A farm policy board or commission might make a substantial contribution toward this end. Congress would legislate basic policy but would lay down general guide lines rather than trying to specify exact price levels, national quotas, or storage limits. The board would make decisions on such matters and would study programs in operation. Periodically it would report to Congress on the economic position of agriculture, on problems requiring new policy decisions, and on the impact of the programs on the farm and nonfarm economies. Actual administration of programs would remain in the Department of Agriculture. In general, the suggestion of a board is an attempt to remove major operating decisions by a small degree from the intense political and private-interest pressures to which Congress and administrators are subjected, to introduce more economic analysis and continuity in policy formulation, and to provide a relatively disinterested interpretation of agriculture's economic problems.

An Approach to Supply Control

A major misfortune of any new farm program is that it must start from where we are now. A real supply control program should attack the most pressing problems at once. It should be capable of expanding to other areas if this is desired, but also it should be able to operate effectively at any one of several stages from narrowly limited to comprehensive coverage of agriculture.

The need for supply control is greater in crops than in livestock products (including dairy and poultry). Hog producers have halted output expansion in response to low prices when they had an alternative outlet for their corn—the loan program—and probably would do approximately the same if excess feed grains were not available. Poultry producers have adjusted production after intense price pressure, and dairy producers, who adjust output much more slowly, are not now faced with important surpluses. In crops, however, we have enormous stocks of wheat and feed grains. Excess cropland is available for use at virtually zero opportunity cost, and low prices will not shut off the flow of crop production in this situation.

The first, essential step, then, is to bring average crop production down

to levels that will clear markets at intended prices. The crops accounting for most of the land not in hay or pasture (feed grains, wheat, cotton, and soybeans) or already under acreage allotments (tobacco, rice, peanuts, and sugar) would be controlled. Both sales quotas and the associated land restriction described earlier would be used on cotton, soybeans, tobacco, rice, and peanuts. Compulsory acreage allotments, with nondiversion of acreage, would be used for feed grains. Wheat would have both the feed-grain type of acreage control and sales quotas, and no attempt would be made to prevent the feeding of wheat to livestock on the farm that grew the wheat.

The conservation reserve would be modified and expanded, and growers who put whole farms in the reserve would be permitted to sell any sales quotas they might have. Possibly this could also be done with feed grain acreage allotments by conversion of the acreage to bushel equivalents. Other crop producers would be permitted to sell one year's sales quotas but not to sell quotas permanently.

Price support and storage operations would be continued, but the objective would be to stabilize prices and market supplies at levels consistent with production controls. Unless government export subsidies were continued, a self-financing two-price arrangement for foreign sales would be necessary for wheat, rice and perhaps cotton.

Controls would be adjusted to clear present commercial markets, and currently-held stocks in excess of normal plus emergency needs would be disposed of by P.L. 480 and other programs outside of commercial trade channels. Later on, P.L. 480 sales would be added to commercial demand in computing national quotas.

Once crop controls were established, controls could be extended to livestock and livestock products if producers desired them and as feasible means were developed. Probably controls taking the form of a significant penalty on over-quota production but not attempting to set fixed limits on sales would be most feasible and sufficiently effective if feed supplies were controlled.

A variety of smaller-scale activities under marketing agreements and orders or conducted by farmers' cooperatives will contain elements of supply control and may be particularly suited to special situations. Significant farm bargaining power in the markets for major farm products, however, will require government supply control programs.

The general topic of this session refers to comprehensive supply control. The position taken in this paper is that supply control cannot start on a comprehensive basis, that control should be capable of stopping at intermediate points, and that complete supply control of agriculture, though possible, is not in sight soon—say, in the next decade. We have a mixed economy in this country, and while governmental influence is

much more important than is often admitted, governmental direction rarely becomes the sole influence. This is likely to be so in agriculture. The problem is to strike the right balance for the times between private and governmental activities and to gain the principal advantages of each.

SUPPLY CONTROL: FARMERS UNION VIEW

J. A. BAKER
National Farmers Union

DR. BRANDOW has left me little additional to say beyond, "We agree."

National Farmers Union has long urged adoption of a comprehensive system of commodity supply controls of the general type, and for the reasons, Dr. Brandow has so ably presented.

Farmers Union is dedicated to the preservation and improvement of the owner-operated family farm. Our observations indicate that attainment of this aim is highly correlated with improving farm net income.

Our program seeks to expand both commercial and humane domestic and foreign demand for farm commodities by all effective and proper means and to maintain whatever national safety and security reserve that calculated risks indicate to be needed.

But when this is taken care of to the fullest extent desired by society, as expressed by effective market demand and Congressional appropriations, we recognize that farm income in the 1960's, as Dr. Brandow predicts, can only be improved, and prevented from dropping further, by operation of price stabilization and supply control measures adapted to the characteristics of the different commodities, to balance total market supply of farm commodities with total demand at fair prices that will return to farmers parity of income on labor, capital and management inputs.

There are only three secondary points in Dr. Brandow's paper on which we might not be in full agreement.

The first is the idea of negotiability of marketing and production quotas. However, by the time George gets through hemming in the concept, along lines we think desirable, there is really only one thought I would add to his statement. Democratically-elected farmer committees probably should be given greater authority annually to adjust quotas locally, as well as nationally, and to set up flexible safeguards against the permanent alienation of sales quotas or acreage allotments by farmers who may not be fully aware of their value.

Experience with the Conservation Reserve indicates that primary emphasis on the whole farm approach does not lend the program any great

public popularity in the areas that Brandow denotes as the "extensive margin." We recognize the need for continuing fundamental long-term regional land use adjustment, but there is also a deep feeling in rural America that each farmer should take his fair share of the adjustment required to bring supply into balance with demand. Temporary retirement of whole farms is neither needed nor justified. Moreover, it has proved to be unnecessarily destructive of the family farm pattern of agriculture settlement and of rural neighborhoods, communities and trade centers.

Lastly, while I admit Dr. Brandow's point of the apparent political expediency of uniform adjustment rates from farm to farm, I submit, also, that consideration of the principle of distributive justice, and in many situations, the imperative of practical politics, demand that large producers be required to take a greater percentage cut than small producers, as is urged in the Farmers Union program. This is the same principle that is recognized in the graduated income tax. Incidentally, we are opposed to the idea of minimum quotas applied to single commodity programs, if some other way can be found to meet the problems which the minimum allotment was designed to solve, because they unduly shift production out of the central production areas.

We could not agree more with Dr. Brandow's statement that "Price stabilization should be purposeful rather than a hoped for consequence" of farm income stabilization programs. Even in marketing orders, as well as in Federally-operated production and marketing quota programs, the price goal should be specifically spelled out with authority for someone to exercise sufficient powers and operations to attain the specified price goal.

Relative to George's statement that "Supply control obviously infringes freedom of individual action," it should be pointed out, in Dr. John Brewster's terms, that the type of freedom so infringed is that of the "enterprise creed" and not that of the "democratic creed." Farm commodity supply control of the type urged, or likely to be approved by farmers' referenda, does not infringe, violate or reduce any of the fundamental citizenship liberties and rights of the individual. Incidentally, wheat producers, on July 21, just approved marketing quotas by the largest percentage (87.3 percent) "yes" votes in history. The greater economic justice facilitated by a workable supply control program may actually expand and nourish the rights and liberties of individuals who are chronically disadvantaged by circumstances beyond their control.

There may be other important points in Dr. Brandow's paper that are in substantial disagreement with the Farmers Union view. If there are, I have misjudged their significance or else missed them altogether.

Since I was asked to present the Farmers Union view of supply con-

trol, I must, to be accurate, ask, in Capital Hill idiom, to be fully associated with Dr. Brandow's statement, with the exceptions I have noted.

Mr. Chairman, because George has presented a point of view so nearly parallel to that which you asked me to cover and has done so quite adequately, in my opinion, I yield back the remainder of my time.

COMPREHENSIVE SUPPLY CONTROL: THE FARM BUREAU VIEWPOINT

W. E. HAMILTON
American Farm Bureau Federation

PROFESSOR BRANDOW has provided a good basis for our discussion. He has outlined the case for supply control, discussed some problems, and suggested an approach.

It is possible to agree with Brandow on many points without agreeing that his suggested approach should be put into effect. The question of what ought to be done involves values on which there are disagreements among economists, as well as among farm organizations.[1] It also involves judgments with respect to the probable outcome of events which cannot be precisely predicted. Economic analysis can indicate the probable results of an assumed course of action. But political and practical considerations can prevent realization of the assumptions and thus alter results.

In this paper supply control is assumed to mean compulsory restriction of sales or production. It does not include producer responses to economic conditions or government programs to encourage voluntary adjustments in resource use.

Farm Bureau's attitude toward the issues we are considering reflects a conviction that the economic problems of overproduction and low prices cannot be solved by political programs to fix prices and ration the right to produce. Farm Bureau has not proposed that all farm programs be abolished—for, as Brandow has so well said, any program "must start from where we are." The real question is the direction we wish to go. Farm Bureau's preference can be summarized as follows:

> It is our desire to move in the direction of eliminating government regulation of the right to produce agricultural commodities. . . .
>
> Where price support and production adjustment programs are used they should be designed to facilitate orderly marketing rather than to fix prices.[2]

[1] See, for example, the papers by Boris Swerling, Stanford University; John A. Schnittker, Kansas State University; and the commentaries by J. Carroll Bottum, Purdue University, and George Mehren, University of California, at the Conference on Goals and Values in Agricultural Policy, The Center for Agricultural and Economic Adjustment, Iowa State University, Ames, Iowa, June, 1960.

[2] *Farm Bureau Policies for 1960*, pp. 11 and 13.

This general position does not preclude indefinite continuation of limited supply control activities in special situations—for example, sugar and tobacco. It does, however, express a strong preference for reducing, rather than increasing, the use of government control as an instrument of farm policy. The reasoning back of this preference will be illustrated as we proceed with our discussion.

General Considerations

The stock arguments for supply control are that demand for farm products is inelastic and that nonfarm groups are administering prices and wages through private activities. Brandow appears to accept these arguments less critically than I do.

Laying aside practical considerations, an inelastic demand is a persuasive argument for effective supply control, at least in the short run. This is more true for commodities that have had chronic surpluses than for commodities, such as livestock, poultry and eggs, that have had alternating periods of high and low production.

A number of factors suggest that supply control would tend to stabilize marketings of livestock and poultry products somewhere between the extremes that now result from producer reactions to market prices. These factors include the importance of livestock and poultry as converters of other farm products; the difficulties of applying controls to such complex industries; and the probable attitude of consumers toward proposals to reduce average per capita supplies of major food products. Thus, potential gains from controlling supplies of livestock and poultry may be limited by the probability that supply control would mean larger supplies and lower prices at what otherwise would be the low end of the production cycle.

Brandow concludes that a supportable case for extreme differences between short-run and long-run elasticity "can be made only in special cases." Supply control might well alter this conclusion. Controls can set in motion, or accelerate, forces that have a potential for shifting demand away from the controlled product.

Some farm products are faced with competition from synthetics and other substitutes. More may be in the future. The development of a competitive product often requires substantial investments in research, production facilities, and promotion. Any policy that raises the average market price of a commodity tends to encourage efforts to develop substitutes and to discourage investments that might improve the competitive position of the controlled commodity. While the possibilities of developing substitutes may be more remote for some farm products than for others, it would be rash to say that technology cannot at least reduce the demand for any commodity. The synthetic fiber story is well known. In the

tobacco industry technological developments—such as homogenization and filter tips—have reduced the need for natural leaf and permitted more extensive use of cheaper grades. Economic incentives created by government programs undoubtedly contributed to these developments.

The effect of U.S. policies on foreign production must also be considered. A U.S. program can provide justification for higher levels of support than otherwise would prevail in protection-minded importing countries. It can hold an umbrella over efforts of other exporters to support prices. Price support activities tend to make U.S. exports dependent on government policy and the government is likely to consider the interests of competing nations—particularly in the important dollar market. Thus, the competitive position of U.S. products may be weakened by control activities even though exports are subsidized. Total U.S. exports may be maintained or expanded for a time by gifts or foreign currency sales, but such transactions are not a dependable substitute for commercial trade based on mutual benefit.

It is true that many firms try to keep production in line with the volume that can be sold at prices administratively determined by the seller. It is possible, however, to overemphasize both the ability of industry to protect its income by such procedures, and the significance of industry practices as guides to farm policy.

The ability of any individual firm to set selling prices is subject to limitations. It must consider the nature of its product and the structure of its industry; what competitors are likely to do; and the possibility that customers might turn to substitutes or imports. Collusion in restrictive actions is subject to antitrust laws. As Brandow has noted, competition is often intense. This is true between, as well as within, industries. For example, the steel industry cannot afford to ignore the actual and potential competition of lumber, plywood, aluminum, glass, cement, plastics, and other materials. Price cutting may be more common than many believe as cuts are often obscured by model changes, discounts, trade-in allowances, added services, tie-in offers, and other devices. Cutting volume to maintain prices does not necessarily stabilize income, and profits vary widely in many industries.

The real question, however, is whether farmers can successfully use the power of government to do for agriculture what industry allegedly is doing for itself. In the exercise of private market power, decisions are made by individuals who are directly concerned with the results—not by a government agency. A private decision to cut production normally will mean efforts to eliminate marginal operations and reduce employment. A government decision to reduce production by controls is likely to mean an across-the-board cut for all producers (except possibly the very small) without regard to economic considerations such as differences in produc-

tion costs, comparative advantage, and economies of scale. Brandow says agriculture "retains resources that other industries would drop," but his suggested approach would not be selective of the resources to be dropped.

Referring to the public relations problems created by high Treasury expenditures for agriculture and large surpluses, Brandow says, "Successful supply control . . . would eliminate these major objections to present programs." Successful supply control presumably would reduce surpluses, although it probably would result in larger carryovers of storable products than would occur in a free market. But supply control would not necessarily eliminate Treasury costs. As Brandow has noted at a later point, a program that effectively supported domestic prices probably would require "substantial export subsidies" or a two-price plan.

Present price support expenditures for major export crops tend to show up as export costs. Subsidies on commercial exports averaged 8 cents per pound for cotton and 58 cents per bushel for wheat in the 1959-60 marketing year. Per unit costs were far larger for the substantial quantities exported under P.L. 480. Program costs could be reduced by cutting CCC stocks and exporting directly from current production. But a program that attempted simultaneously to reduce surpluses; to raise income by raising prices; and to eliminate export subsidies would face a formidable task.

Any increase in domestic prices would widen the gap between domestic and world prices. Any reduction in export volume, or in export subsidies, sufficient to reduce Treasury costs materially would tend to offset the income effects of higher domestic prices. Thus, use of a two-price plan to reduce costs would increase the level of domestic prices needed to reach any given income goal. Raising domestic prices to offset lower prices in the export market would have little appeal to urban voters. Higher domestic prices for cotton would aggravate the already serious problems of the textile industry and speed the shift to synthetics.

Export subsidies and two-price plans do violence to the idea that international trade should be based on comparative advantage. While we are now subsidizing exports, we need to consider the direction we wish to go in the future. A continuing policy of dumping farm products abroad complicates our foreign relations. It also encourages the growth of protectionist sentiment both at home and abroad.

As Brandow and others have noted, any income gains arising from supply control would tend "to be capitalized into land or certificate values." In the words of Professor Cochrane, "The price of these certificates would become the cost of doing business in a stabilized agriculture."[3] The to-

[3] Cochrane, Willard W. "Some Further Reflections on Supply Control," *J. Farm Econ.*, 41:700, Nov. 1959.

bacco program provides abundant evidence on this point.[4] The capitalization of program benefits means initial gains for landowners, but it leads to higher capital costs as land changes hands.

Even if Brandow is right in his estimate "that moderate gains in net farm income achieved by supply control—say, on the order of one-fourth—would have lasting and favorable effects," the capitalization of benefits obviously would reduce the efficiency of supply control as a means of increasing returns to the human factor in agriculture. This supports the conclusion that "labor adjustment is an essential complement to successful supply control in the long run." It may be observed that labor adjustment would be helpful under other approaches and that Brandow's conclusion gives little comfort to those who seek to avoid further declines in the number of farmers.

It is easy to agree with Brandow that supply controls would not preserve the status quo. It is more difficult to accept his cautious optimism relative to the possible enactment of controls that would be neutral with respect to farm size. Supply control is being advocated as a means of preserving the family farm by groups that apparently hope to prevent further declines in the number of farms. Supply control bills introduced in the 86th Congress as the "Family Farm Income Act of 1960" were not neutral on farm size. Concern over farm program costs creates pressure for ceilings on the benefits. Proposals to authorize permanent transfers of allotments or quotas invite restrictions on the right to expand by this method.[5]

Brandow's conclusion that "a properly integrated operation will not be possible if autonomy is given to individual commodity programs" is fully justified. But the supply control proposals thus far attracting the most attention in Congress would delegate program development to commodity committees with no provision for coordination.[6]

---

[4] See "The Sale Value of Flue-Cured Tobacco Allotments," Publ. No. 35 of the Southeast Land Tenure Research Committee, April 1960.

[5] One version of the "Family Farm Income Act of 1960," H.R. 10355, by Rep. Poage of Texas, proposed a ceiling of $10,000 on payments to individuals; another version, H.R. 10363, by Rep. McGovern of South Dakota, proposed a ceiling of $5,000. Later versions made no direct provision for the limitation of benefits to individuals, but included limits on total costs which could have provided a basis for subsequent action to limit benefits to individuals. Professor Brandow's suggested approach contemplates price support operations rather than payments; however, a precedent for limiting commodity loans was established in the Agricultural Appropriations Act of 1960. H.R. 7041, a bill introduced by Rep. Abernethy of Mississippi on May 11, 1959, to authorize the permanent transfer of acreage allotments, proposed a series of limitations on the acreage that could be acquired by this method.

[6] See H.R. 10355, H.R. 10363, H.R. 11769 and similar bills introduced in the 86th Congress.

Specific Problems Inherent in the Suggested Approach

The practical and political difficulties that must be faced in developing supply control programs are easily illustrated by comparing portions of Brandow's general discussion with his section on "Ways and Means of Supply Control."

In his general discussion, Brandow says, "Ideally, controls would be placed on quantities sold rather than on particular inputs . . ." Later, he concludes that "compulsory restriction of land devoted to feed grains seems the only feasible means of controlling their production and market supply." He has not discussed the political and administrative problems that historically have prevented application of compulsory controls to feed grains.

The control of quantities sold has obvious advantages over the control of inputs, but problems are involved for other commodities as well as feed grains. Brandow has recognized the difficulty of applying rigid quotas to marketings of perishable commodities that move to market in a year-round flow. He has suggested that this problem be dealt with by "devices to reduce marginal returns from above-quota production without attempting to prohibit such production entirely." This would penalize year-to-year variations in marketings some of which result from natural causes. It also would tend to operate as a tax on the efficiency of producers with high marginal returns. Experience with price controls during World War II suggests that penalties on the marketing of over-quota livestock might lead to a black market.

While Brandow believes quotas should be negotiable where feasible, he concludes: "Negotiability of acreage allotments (considered essential for crops) is not workable because yields vary so much from farm to farm and region to region." It may be added that vested interests in keeping crop production where it is would stimulate powerful Congressional opposition to the transfer of production rights across State lines.

As Brandow has correctly noted, any effort to control field crops will involve a diverted acres problem. This problem obviously is more serious for feed grains, wheat and cotton than for small-acreage crops such as tobacco and peanuts. The conclusion that "controls on specific crops must provide that acreage of uncontrolled crops will not be increased and that idled acres will not be grazed," is sound but it poses some problems.

The control of diverted acres has been discussed for years, but the Congress has yet to order the type of control Brandow has proposed. In 1954, the Secretary of Agriculture announced an intention to restrict the use of diverted acres under general authority, only to encounter a storm of protest that forced him to withdraw the proposed restrictions. In 1959, and again in 1960, Congress indicated a willingness to require the idling

of land to be diverted by further cuts in wheat allotments, but only if payments-in-kind were made to producers.[7] Brandow apparently recognizes the difficulty of getting farmers to idle land without compensation as he proposes continuation of the Conservation Reserve.

The level of price support to be maintained under a supply control program presents both practical and political difficulties. Brandow says, "Price stabilization should be purposeful rather than a hoped-for consequence of storage operations." He also says "the objective would be to stabilize prices and market supplies at levels consistent with production controls." If the justification for supply control is the inelasticity of demand it would seem that the emphasis should be on keeping production controls and market supplies consistent with established price goals.

In the case of sugar—the one commodity now subject to real supply control—prices have been stabilized within relatively narrow limits without direct support. But sugar is a deficit commodity, and contingencies normally can be met by varying import quotas. In the case of most commodities, the desire of the government to avoid blame for shortages and the tendency for producers to resist sharp cuts in production make it unlikely that supplies would be restricted sufficiently to achieve the price goals—of those who advocate controls—in the absence of direct support activities.

Groups advocating supply control also want price guarantees, but such guarantees encourage producer resistance to effective controls. Thus, there is no assurance that supply controls would reduce the importance of price supports or eliminate the problem of government accumulations.

Brandow has not dealt with the difficult task of allocating production rights in the livestock, poultry and dairy industries. Perhaps it is fortunate that these industries are difficult to control as any reduction in livestock or poultry production would increase the already substantial need for adjustments in grain production.

Considering the probable need for substantial export subsidies, the implied continuation of P.L. 480, and the cost of a voluntary land retirement program, Brandow's suggested approach appears to be a fairly expensive package.

The possibilities of removing important operating decisions from political and private-interest pressures by establishing a farm policy board appear limited. Efforts certainly would be made to influence appointments to the board, as well as its decisions. Programs requiring appropriations are subject to frequent review; and farmers dissatisfied with board rulings would be quick to appeal to Congress.

---

[7] See S. 1968 as vetoed by the President on June 25, 1959; S. 2759 as passed by the Senate on June 9, 1960; and H.R. 12261 as reported by the House Committee on Agriculture on May 20, 1960.

Concluding Observations

Brandow's case for supply control rests not only on the inelasticity of demand, but also on the assumption that farmers will not adjust crop production in response to market prices. He says, "Excess cropland is available for use at virtually zero opportunity cost, and low prices will not shut off the flow of crop production in this situation." Land is available, and farmers are unlikely to let productive land lie idle outside a government program. But this does not mean that the intensity of land use is not affected by costs and returns. The historical tendency for total cropland to remain relatively stable is not conclusive evidence to the contrary.

Farming is increasingly an industry of high out-of-pocket costs. Land use adjustments take time, but land that cannot be cropped profitably at prevailing prices is likely to be diverted to less intensive uses, such as hay and pasture. Such shifts can contribute to a solution of the surplus problem. Labor adjustment and land retirement—which Brandow sees as supplements to supply control—would facilitate needed adjustments in the direction of a less intensive agriculture with or without supply control.

Brandow says, "Significant farm bargaining power in the markets for major farm products . . . will require government supply control programs." If he means the kind of bargaining power that is capable of exacting a monopoly price, he is right. But this does not mean that farmers cannot improve their market position without government controls. One of the fundamental differences between agriculture and industry is that much of industry produces to fill orders, while the average farmer produces to employ resources and then seeks a market for his output. Farm Bureau believes there is a great opportunity to reduce fluctuations in farm prices through contractual arrangements between producers and market agencies, provided the objective is to find the equilibrium price rather than to fix prices at an artificial level.

Brandow is right when he says, "Supply control obviously infringes freedom of individual action and involves more government intervention in economic affairs than many people think desirable." He is also right when he says "most people will . . . give up a little satisfaction in one area to gain in another." The question is whether potential results are worth the price.

Farm Bureau's reluctance to go the control route is based on experience with control programs that, in Brandow's words, "have been tested and found wanting." In Farm Bureau's view the thing that has been found wanting is the idea that politically-determined decisions should be substituted for the impartial operation of a market system. The loopholes and exemptions that have weakened allotment and quota programs were

adopted because they were politically appealing. It may be, as Brandow has suggested, that some people are now seeking "effective control devices, rather than merely palatable ones," but I doubt that many members of Congress are doing this. The political considerations that have impaired past efforts to control production are likely to continue to do so.

If supply control is viewed as a means of helping farmers take advantage of the inelasticity of demand, controls might well be offered as a substitute for price supports. But people who have advocated government price-fixing and large carryovers in the past now advocate supply control as a justification for further efforts to fix prices, or returns, on a political basis. The real issue is whether we are to have a government-planned agriculture.

While it may appear that there are short-run advantages in the control approach, Farm Bureau believes that the long-run results would be to increase costs, impair efficiency and reduce opportunity for the individual farm family.

POTENTIALITIES AND LIMITATIONS OF COMPREHENSIVE SUPPLY CONTROL: AN INDEPENDENT VIEWPOINT

D. E. HATHAWAY[1]
Michigan State University

THE excellent paper by Professor Brandow reflects his typical thorough analysis and careful workmanship. It constitutes a forward step in the examination of the potentialities and problems of a comprehensive supply control program for American agriculture. Many tantilizing details of the internal workings of the outlined program invite comment, but I shall put aside these minor temptations to concentrate upon certain aspects of supply control that have not been covered adequately in other discussions.

As a preface, it seems necessary to comment upon the direction of farm policy. Having successfully overcome the notion that our entire economy hinged upon our agricultural price policy, we now have gone the full circle and tend to assume that what we do in farm price policy has no effect outside the farm economy. At the very time when agriculture is becoming noticeably more interwoven with the nonfarm economy and clearly dependent upon it for political strength, agricultural policy has an increasingly agricultural orientation. Thus, proposed programs are discussed with little regard for their impact on the domestic nonfarm econ-

[1] The author received helpful comments from L. L. Boger, J. T. Bonnen, G. L. Johnson, and L. W. Witt.

omy and the international economy. Therefore, I shall attempt to bring a few such elements into the discussion.

My discussion proceeds from the following assumptions: (1) Farm income is below desirable levels and would be even lower for a protracted period if no government income transfer program were operating; and (2) Some kind of income transfer program will be continued for agriculture, unless the program proves so onerous to the nonfarm population that they refuse to support it. With these assumptions in mind, let us examine several issues not adequately discussed in a comprehensive supply control program for agriculture.

The Structure of the Agricultural Industry

Much is made of the contrast between the agricultural industry and large-scale nonfarm corporations which apparently are successful in some measure of supply control for their industry. The characteristics which make possible such supply control in the nonfarm economy are lacking in agriculture, and this lack vastly complicates the problems of such an approach in agriculture.

In those industries usually cited as successful in practicing supply control, the management, ownership of capital, and provision of labor are clearly separated. It is agreed generally that the primary function of management in such industries is to maximize net returns to capital which are paid to the owners, not the returns to labor or the combined returns of capital and labor. Moreover, supply control which maximizes net returns is possible without policing because the separation of capital ownership and labor means there is no offsetting economic incentive to utilize unemployed labor. In agriculture the joint returns of capital and labor provide a powerful incentive to managers to utilize unemployed labor to increase output, with policing problems as a result.

The evidence is quite clear that the burden of supply control in nonfarm industries with potential excess capacity falls upon labor. The plight of the permanently unemployed coal miners in West Virginia and the temporarily unemployed steel and auto workers in Pittsburgh and Detroit provide vivid testimony that not everyone shares equally in the fruits of industry supply control. Society increasingly is concerned regarding such problems in the nonfarm economy and has adopted measures to ease the economic burden. Similar measures have not been proposed to offset the unequal economic adjustments that might accompany comprehensive supply control for agriculture.

The problem of what resources—in what locations and owned by whom —would be unemployed by a comprehensive supply control program has not been analyzed clearly. Professor Brandow's paper tries to have it both ways, pointing out in one section that land would be used more ex-

tensively and in another section that poor land will be retired. My own feeling is that comprehensive supply control would increase the advantage of the large-scale farm which depends heavily upon hired labor and hasten the demise of the family farm, particularly where the family operator has any alternative economic opportunities.

Who Pays for the Income Transfers?

"A rose by any other name would smell as sweet" also applies to income transfer programs. Regardless of method or the name by which it is called, we are discussing the use of the power of government to transfer income from the nonfarm economy to the farm economy. It is unlikely the consuming public will believe otherwise, even if the market mechanism is used to effect the transfer. Therefore, those who constitute this public are likely to exact three demands in return for income transfers. They are likely to want (1) to determine who receives the benefits of the transfer, (2) to determine who bears the major cost of the transfer, and (3) to obtain desired patterns of agricultural production in return for the income transfer.

It is unlikely that the nonfarm public will be satisfied with the use of the market mechanism via a comprehensive supply control program to achieve their goals relating to agriculture. Most nonfarm support for income transfers to farmers rests upon the desire for improved income equity between farmers and nonfarmers. I agree with Professor Brandow's appraisal that an effective supply control program would do little to help the lower income farmer and that its main benefits would accrue to the largest and most efficient farmers. It is doubtful if the public, which must pay for an income transfer program, will accept this kind of distribution of benefits within agriculture.

The second point is closely related to the first. The proposed supply control program would place the incidence of the income transfer program upon the consumers of farm products in direct proportion to their consumption. The incidence, of course, would be more retrogressive than would programs financed from the Treasury with an income tax. It is doubtful that the public will support a program which will transfer income from lower income consumers to the higher end of the income scale of agriculture.

Third, it seems reasonable to expect that the paying public will exact certain terms in return for a continued income transfer program to agriculture. It probably will demand an end to the constant accumulation of surplus stocks, with their accompanying storage costs which do not benefit farmers. To this extent the comprehensive supply control program is a step in the desired direction. However, I think the public will also de-

mand that the composition of farm output be increasingly weighted towards livestock products and fruits and vegetables. This the supply control program could do, but it is not inherent in it as proposed.

The major demand that the nonfarm economy will make of agriculture is that the program make a positive contribution to solving the farm income problem so that the income transfer program will not continue indefinitely. A comprehensive supply control program might force sufficient reorganization within agriculture to achieve this, but it is doubtful, and it would be accidental rather than planned if it occurred. The nonfarm public has been hoodwinked once that a stop-gap program offered a permanent solution to the farm problem. It is doubtful they can be so persuaded again.

Can the Nation Afford the Comprehensive Supply Control Program for Agriculture?

There is general agreement that we cannot afford to continue the present program or to embark upon an unlimited direct payments program. The costs involved in such discussions are Treasury costs, which under a successful supply control program would be lower. However, the lower Treasury costs would be offset by higher market prices to consumers. Therefore, the income transfer under a supply control program would be as large, given a level of farm income.

There are other major costs of a farm program which are important, but which usually escape discussion. These are the side effects of the program. In the case of the supply control program these include its probable effects upon domestic inflation and international relations. The same industries that have successfully practiced supply control in the nonfarm economy have been significant contributors to the continued rise of retail prices in recent years.[2] Conversely, stable and declining farm prices have helped slow the inflationary pace of the past decade.

An effective comprehensive supply program would mean that farm prices and food prices would become an integral part of the inflationary spiral.[3] Even modest rises in food prices soon would be reflected in wages via escalator clauses and subsequently in the price of manufactured products and services. Higher nonfarm prices would in turn require another increase in farm prices, and the problem of inflation without full employment would be intensified. There are ways in which income transfers to farmers can be achieved outside the price mechanism, and given the current structure of our economy and its propensity to transmit rap-

[2] Otto Eckstein and Gary Fromm, *Steel and the Postwar Inflation*, Study Paper No. 2 prep. for Joint Economic Comm., Nov. 6, 1959.

[3] The incidence of inflation also appears to be retrogressive. See Boris P. Pesek, "Distribution Effects of Inflation and Taxation," *Amer. Econ. Rev.*, Nov. 1960, p. 147.

idly even temporary price rises, income transfers outside the price system would be less likely to trigger undesirable inflationary forces.

Professor Brandow has faced the drains of a comprehensive supply program on our stock of international good will somewhat more realistically than most proponents of the program. Import controls over competing farm products would be required. Since the producers of major export crops, notably wheat and cotton, could not exist on the income from the domestic market, extensive export subsidies would be required. This combination would be a clearly identifiable move toward economic nationalism by the United States at a time when world events call for an opposite policy. The cost of such a move to our delicate international position cannot be known, but it should not be underestimated. At this juncture of world affairs, perhaps any such cost is greater than the nation can afford.

Who Will Determine the Course of Farm Policy?

Toward the end of his discussion Professor Brandow suggested that a farm policy board or commission should be considered to develop and carry out farm policy in a coherent flexible manner isolated from the heat of partisan politics. This would appear to represent the ultimate in a policy developed by agriculture and for agriculture. Historically, agricultural policy has been subject largely to the influence of farm groups and few others, and this proposal would perpetuate this system. However, it appears that the trend may well be in the opposite direction, with the only individual who must face the general electorate—the President—given the major responsibility for the development and execution of farm policy. If such should be the case, many groups which heretofore have been relatively ineffective in agricultural policy will gain strength and influence the direction of our farm programs.

One such group would be consumers and those who purport to represent them, whose enthusiasm for comprehensive supply control would be dampened by some of the considerations I have mentioned, namely, who pays and who benefits. Another group with strong personal interests contrary to an effective supply control program are those engaged in the handling and storing of farm commodities, a group which includes many farmer cooperatives. These are joined by the individuals who engage in the buying, selling, and speculation in agricultural commodities. One such group openly advocated direct payments recently.[4]

Another group that would oppose effective supply controls are those who sell items used as inputs in farm production. They would be joined

[4] *Chicago Board of Trade News*, July 1960, p. 1.

by all of the local merchants in areas where widespread land retirement might be expected.

All of these groups might provide formidable opposition to the achievement of a policy of comprehensive supply control program for agriculture, but such a program still might be achieved if all farmers were agreed upon it. But, as one Congressman said recently, ". . . I am opposed to using the power of Government to fix prices. My farmers—and a vast majority of all other farmers in the Northeast—do not want that kind of government farm program, and I know consumers do not want it."[5] The earlier discussions on this program highlight the differences between farm organizations.

Thus, while a comprehensive supply control program for agriculture might have much to offer selected interests in the agricultural economy, I suspect its undesirable impacts outside the agricultural economy may cause it to fail to win the necessary nonfarm political support. Therefore I, like Professor Brandow, doubt that comprehensive supply control for agriculture is in the immediate offing.

---

[5] Speech by Representative John E. Fogarty, Rhode Island, *Congressional Record*, June 9, 1960.

PROBLEMS OF RAISING INCOMES IN LOW-PRODUCTION AREAS OF AGRICULTURE

CHAIRMAN: W. E. HENDRIX, AGRICULTURAL RESEARCH SERVICE, USDA

THE RURAL DEVELOPMENT PROGRAM AND UNDEREMPLOYMENT IN AGRICULTURE*

C. E. BISHOP**
North Carolina State College

Introduction

THE Rural Development Program is considered one of the major efforts of the United States to facilitate economic and social development of rural areas. The program assumes an important role from two points of view. First, it is our principal program which is aimed directly at the development of rural areas. Second, it is our example to the world of how to promote rural economic development. Both roles are highly important to a country that is engaged in a gigantic struggle seeking to convince other nations that its way of life offers the greatest possibility for their future development.

In an earlier paper I pointed out that there are two distinct economic problems involved in rural development.[1] These problems are: the transfer of resources among uses, i.e., moving along production possibilities functions; and resource development, i.e., shifting production possibilities functions outward.[2] The latter problem is a kind of problem which we hope will always exist. We never really want to catch up with our potentialities. We hope that advancement in technical and social knowledge will keep an ever higher potential in advance of us. At any point in time, however, we hope to be moving in the direction of closing the gap between our present circumstances and our immediate opportunities. That is, we hope to transfer resources among uses in such a way that the economy will approach adjustment with respect to production possibilities at any point in time. One of our major resource allocation problems at all times, however, is that of deciding how to use our resources so as to keep our production potential continuously moving outward at a rapid rate.

---

* Approved by the Director of Research of the North Carolina Agricultural Experiment Station as paper No. 1220 of the Journal Series.

** The author is indebted to J. C. Williamson, Jr., of North Carolina State College for helpful suggestions.

[1] C. E. Bishop, "Approaches to Rural Development," *J. Farm Econ.*, 39:271, May 1957.

[2] Although these are two distinct problems, they are not independent since future production potential is determined in part by present resource allocation.

A sound rural development program should be focused upon both the problem of transfer of resources among uses and the long-run problem of resource development. The U.S. Rural Development Program properly is broadly defined. Its stated purpose is "to help families on small farms with limited resources to attain greater opportunities in an expanding economy."[3] Presumably, this may be accomplished through transfer of resources owned by people living on farms or through increasing the productivity of their resources through resource development. The Rural Development Program contains activities directed at low incomes resulting from limited ownership of assets and inferior preferences as well as underemployment of resources.[4] It seems clear, however, that principal emphasis is placed upon the problem of underemployment.

The principal resource owned by families on small farms is labor. The low incomes of families on small farms stem in large part from the low return received for their labor. Efforts to increase the incomes of these families, therefore, involve to a large degree increasing the returns for labor services. If the Rural Development Program is to be successful, it must result in increased productivity and increased returns for labor of families now living on small farms. The question to which I would like to address my attention is as follows: Is the Rural Development Program as it is now operating an effective program for combatting underemployment of labor in U.S. agriculture?

The Policy Implications of Underemployment of Labor

Labor is underemployed in agriculture when the marginal real return received for labor in agriculture is less than the marginal real return received for comparable labor in other uses.[5] From the standpoint of the individuals involved, a meaningful definition of underemployment must give due weight to nonpecuniary as well as to pecuniary considerations. The definition of underemployment used in this paper implies that there is labor in agriculture which is willing to move to other employment at prevailing rates of return for labor in the alternative employment. The very existence of underemployment is prima-facie evidence of a departure from competitive equilibrium. Persistence of underemployment raises serious questions about the competitive character of the economy. For our purposes, we need to identify the nature of the impediments which generate the underemployment and to appraise the effectiveness of particular programs in overcoming these impediments.

[3] First Annual Report of the Secretary of Agriculture, Sept. 1956.

[4] For a discussion of the three types of low-income problems see: C. E. Bishop, "Public Policy and the Low-Income Problem," *Farm Policy Forum*, Spring 1955.

[5] C. E. Bishop, "Underemployment of Labor in Agriculture," *J. Farm Econ.*, 36:258-72, May 1954.

The definition of underemployment used here implies that labor does not move in sufficient quantities to equalize the real return for one of three reasons: (a) capital is not available to finance the transfer of labor among uses; (b) people in agriculture do not know of opportunities for employment of labor in higher paying uses; or (c) alternative jobs simply are not available at the prevailing wage, i.e., there is rationing of jobs which prohibits labor from transferring freely among industries.[6]

The effective supply of nonfarm labor may well be a function of the amount of capital available for transfer of labor from farm to nonfarm employment. When underemployment stems from lack of capital to finance the transfer of labor, clearly the supply of labor for nonfarm employment is not shifting to the right at a rate sufficiently high to equate real returns for labor services at the margin. When labor does not transfer from farms because capital is not available to finance the transfer, the policies appropriate for removing this inefficiency call for increasing the supply of capital available to finance the transfer. This action would increase the supply of labor available for nonfarm employment until underemployment was removed. It is the opinion of this author, however, that this particular impediment to efficiency in resource use is not of sufficient importance to explain the differential in returns for labor services in farm and nonfarm employment. Professor Maddox has illustrated that the costs involved in transferring labor from farm to nonfarm residences even for long distances in the United States are rather trivial.[7]

Underemployment may result from lack of information by farm people of the availability of nonfarm jobs. In this case nonfarm employers are likely to view the underemployment as resulting from failure of the supply of labor for nonfarm employment to increase in line with increases in demand. Underemployed laborers, on the other hand, are likely to view the problem as one of failure of demand for nonfarm labor to increase at a rate which is sufficient to provide employment for all persons who are willing to transfer to nonfarm employment at prevailing wages. In either event the appropriate policy is to provide the relevant information through the employment services or other agencies. From the viewpoint of potential migrants, such action in effect shifts the demand curve for labor to the right; that is, it increases the number of people who transfer from farm to nonfarm employment without altering their willingness to respond to differences in returns for labor services.

Although lack of knowledge of job opportunities undoubtedly was im-

[6] These impediments are intended to include adjustments within agriculture as well as adjustments between agriculture and nonagricultural industries.

[7] J. G. Maddox, "The Private and Social Costs of Migration of People Out of Agriculture," *Amer. Econ. Rev.*, Vol. 50, No. 2 (Papers and Proc.), pp. 392-402 (May 1960).

portant as an impediment to migration at an earlier time, I suspect that its importance has decreased over time. Large numbers of people do migrate, and it is only reasonable to assume that those who migrate communicate fairly accurate information with respect to conditions in the communities to which they migrate. Furthermore, as the farm population continues to decline relative to the nonfarm population, the information that farm people have with respect to living conditions and earning opportunities in urban areas is likely to become more accurate. It seems reasonable, therefore, to expect lack of knowledge of economic and social conditions in nonfarm areas to become less of an impediment to migration of farm people.

A third type of underemployment has been emphasized by Hendrix.[8] This type of underemployment exists when more labor is willing to transfer to nonfarm jobs at prevailing rates of returns than jobs are available. In this case, job rationing limits migration. The supply of labor to nonfarm firms is essentially infinitely elastic in the relevant range. Labor stands ready and willing to transfer from farm to nonfarm employment at prevailing farm and nonfarm relative rates of return for labor. Under these conditions the actual rate of migration is determined by shifts in the demand for labor in nonfarm employment. The problem in this context is one of increasing the nonfarm demand for labor rather than of increasing the supply of labor available for nonfarm jobs.

This conception of the underemployment problem is consistent with the pattern of transfer of labor from farms that one observes in the United States. In fact, the pattern of transfer of labor from agriculture suggests that the United States economy has been characterized by underemployment of labor in agriculture for at least thirty years except possibly during war and for a brief period immediately following World War II when essentially full employment prevailed in the economy and when special subsidies were paid veterans to return to farming. We observe that plants locating in areas which are usually considered to be characterized by underemployment of labor normally experience several well-qualified applicants for each job opening. We observe also that farm people have been converting themselves to nonfarmers at a very rapid rate. Furthermore, we observe that the pattern of migration is affected little, if any, by changes in the relative prices of farm and nonfarm products or in the relative earnings of farm and nonfarm workers. Farm people migrate to nonfarm employment in spite of increases in farm product prices and in spite of increases in the earnings of farmers relative to the earnings of nonfarmers. Obviously, other forces must be de-

[8] W. E. Hendrix, "Income Improvement Prospects in Low-Income Areas," *J. Farm Econ.*, 41:1070, Dec. 1959.

termining the rate of migration. It is my contention that at prevailing rates of remuneration, the demand for labor in nonfarm jobs is the principal factor determining the rate of transfer of labor from farms to nonfarm occupations. Demand is not expanding at a sufficient rate to employ all persons who are willing to transfer to nonfarm employment at prevailing returns for labor. I believe this to be the principal explanation for current underemployment of labor in agriculture.

Appropriate Policies to Combat Underemployment

General economic development

The third kind of underemployment that I have discussed poses the most difficult policy problems.

Appropriate policies for solving this type of underemployment involve altering the conditions of demand for nonfarm labor by shifting the demand function to the right, by making the demand more elastic, by making the demand side more competitive and other measures to remove the job rationing.

Also it may be possible to abolish economic underemployment by reducing the wages of nonfarm labor to the point that the differential in returns for labor in the farm and the nonfarm sectors is removed. I doubt, however, that this policy variable will or should be seriously considered. Forces other than wage patterns contribute to underemployment. The U.S. economy is a highly dynamic economy with new technology being introduced at a very rapid rate. This new technology permeates the nonfarm sectors of the economy as well as the farm sectors of the economy. The new technology is largely labor saving both in agriculture and in nonagricultural industries. In their efforts to reduce costs, entrepreneurs adopt this new technology as rapidly as is feasible. Furthermore, faced with organized labor and relatively high and rigid wage rates, nonfarm entrepreneurs concentrate upon labor saving invention and innovation and upon plant relocation as means of decreasing costs rather than upon recruitment of labor from areas characterized by underemployment and upon wage reductions.[9] Frequent changes in technology, therefore, free labor from both farm and nonfarm industries. Since growth in agricultural markets is limited by the low price and income elasticities of demand, growth in aggregate levels of employment is determined in large part by the rate of growth in the nonfarm sectors of the economy. This rate of growth has not been sufficient to absorb the labor released from agriculture as rapidly as farmers are able to free this labor. Hence, labor

[9] The price of labor in the U.S. has been increasing relative to the price of other factors. Under these conditions there is an incentive to focus research upon labor saving inventions. See J. R. Hicks, *Theory of Wages*, Macmillan Co., 1932, Chap. 6.

that is willing to transfer to nonfarm positions at current relative rates of remuneration for labor is dammed up in agriculture.

Given wage and employment conditions facing entrepreneurs in the nonfarm labor market, underemployment of labor in agriculture stems from the low rate of growth of the nonfarm sector of the economy. There are two major policy variables, therefore, for removal of this type of underemployment: (1) increase ease of entry of labor into the nonfarm labor market, thereby moving along the demand curve for nonfarm labor and decreasing nonfarm wages until underemployment no longer exists; and (2) encourage a rate of economic growth that is consistent with very rapid increases in the demand for nonfarm labor until demand and supply are equated at prevailing nonfarm wage rates. I doubt that the first policy will receive serious consideration. The second policy likely calls for governmental action and, barring greatly improved profit expectations in the private sectors, will involve increased government expenditures.

Adjustments within agriculture

Extensive reorganization of agriculture in low-income areas also is a necessary part of a sound program of rural development. Out-migration alone will not solve the problems of underemployment.[10] There are counties in the Piedmont which have had large-scale out-migration for more than half a century and which still are characterized by low-income families. Even if the total population in low-income rural counties were reduced, efficient agricultural organization would not be achieved without a change in the forms of agricultural capital invested in these areas and a recombination of agricultural resources. The changes which are required here are well known and I shall not dwell on them.

Let me emphasize, however, that the high rate of out-migration and the apparent willingness of farm people to migrate when job opportunities are made available pose the possibility of serious farm adjustment problems in some agricultural areas. The farm population in many of these areas is composed of a relatively large number of people above 50 years of age. Most of these people are not underemployed with respect to current nonfarm employment alternatives. Furthermore, they are not likely to acquire the skills necessary for nonfarm jobs and their only real alternatives are adjustments within agriculture. Certainly the Rural Development Program or other programs should make every effort to assist these people in improving their levels of living. Steps also should be taken to insure that sufficient capital is available for recombination of resources as labor transfers to nonfarm employment and that farm programs are altered to facilitate this recombination.

[10] W. H. Nicholls, "The South's Low-Income Rural Problem and Rural Development Programs," National Planning Assoc., Feb. 1959.

Investment in the human agent

The rate of growth in the demand for labor differs with the skills and training of the labor force. The U.S. Department of Labor has estimated that no more unskilled workers will be needed in 1970 than we have at the present time in our economy.[11] It also has estimated that a very small increase in semiskilled laborers will be necessary to fill expected job openings. On the other hand, a substantial increase in the demand for skilled workers is anticipated.

Since the demand for all grades of labor does not increase uniformly, the extent of underemployment varies according to the skill of the labor force. Hence the supply of unskilled labor may be perfectly elastic at prevailing wage rates and demand may be so weak that underemployment exists; yet, the demand for skilled workers may be so great that demand tends to outrun supply and the rate of transfer may be determined by supply rather than demand. Herein lies one solution to the problem of underemployment. Inasmuch as underemployment tends to be concentrated in the unskilled and semiskilled members of the labor force, one method of reducing the underemployment is to convert the unskilled and semiskilled workers into skilled workers. There is a strong argument in favor of increasing investment in the human agent to increase his productivity. Public policies and programs may exert great influence in solving the problems of underemployment and low incomes over the long pull by encouraging improvement in educational facilities and educational instruction for people in rural areas. Professor Martin's paper contains a strong argument in favor of additional investment in the human agent.

The Rural Development Program as a Means of Combatting Underemployment

The Rural Development Program properly is aimed at the poverty (asset) problems, the preference problem and the underemployment problem. The program contains the following major phases: welfare activities, agricultural adjustment activities, local industrial development activities, and community development activities.

Under the Rural Development Program, intensive campaigns have been conducted to see that farm people receive the benefits to which they are entitled under FOAB, Social Security, and other welfare programs. Clearly, it is desirable that farm people participate fully in these programs. The programs can be effective in combatting the poverty problem. It is equally clear, however, that these programs were intended to be retirement programs and not developmental programs. They are hardly appropriate, therefore, as means of combatting underemployment.

[11] *Man Power Challenge of the 1960's*, U.S. Department of Labor.

As I pointed out above, a successful rural development program will involve agricultural adjustment. It is my opinion, however, that the extent of the adjustments that will be required to abolish underemployment on farms in low income areas is much greater than has been envisioned in the present Rural Development Program. The farm adjustment activities of the present program have emphasized two kinds of adjustments.

First, farm families are being encouraged to produce a large share of their food. Recommendations to this effect constitute a plea for a return to self-sufficiency and disregard the fact that this is an age of economic specialization. Certainly the opportunity cost of employing resources in the production of foods for home use should be considered before such campaigns are conducted.

Second, farmers are being encouraged to increase the size of their farm businesses. In some instances additional credit is being provided for this purpose. The action taken, however, often is too little and too late. The farm adjustment route to rural development will require large increases in capital per worker and if it is to be successful will likely result in a large decrease in the amount of labor employed on farms. Even so, it is quite likely that effective farm adjustment in low-income areas will result in increased production of farm products. Because of the highly inelastic demand for these products, adjustment along this route is likely to affect income distribution within agriculture to the extent that it is effective at all. Production cannot be expanded in areas characterized by underemployment to any great extent without creating competitive pressure in other areas. From the standpoint of the nation, the question becomes one of where farm products can be produced most efficiently. Without development of new technologies this is not likely to be in those areas now characterized by most serious underemployment of labor. Even if new technologies are developed, they are likely to be labor saving in nature, increasing the marginal productivity of capital in relation to the marginal productivity of labor. Innovations of this sort are likely to increase the supply of labor available for transfer from farm to nonfarm employment as well as the supply of farm products. Clearly, such changes, taken alone, are likely to aggravate the underemployment problem rather than solve it.

Local industrial development

It is clear that farm adjustment will result in an increase in the supply of labor for nonfarm employment. The necessity for a transfer of labor focuses attention upon additional nonfarm employment opportunities. Especially important will be policies and programs designed to encourage industrial development of low-income areas and policies and programs

designed to facilitate migration of people from low-income areas to other areas. Certainly some good work has been done in the Rural Development Program in obtaining more accurate labor inventories for local areas. This information has been helpful in focusing attention upon the magnitude of the underemployment problem and has attracted small industrial plants for many counties. One of the greatest weaknesses in the program as it is now structured, however, is that the activities carried on in the program are to a large extent oriented around the county as an economic unit.[12] There is no economic rationale for treating the individual county as a closed economy. Ruttan points out, and properly so, that greater success in expanding job opportunities may be achieved through promotional efforts directed at increasing job opportunities in metropolitan areas which already contain financial institutions and supporting services for industrial development.[13] Metropolitan centers are fairly well distributed throughout the United States. Concentration upon the development of these centers to provide additional nonfarm employment opportunities within reasonable distance of the areas of most serious underemployment certainly has merit.

This policy, however, of developing currently existing metropolitan areas as sources of employment for labor currently employed in agriculture runs counter to one of the basic assumptions underlying the Rural Development Program. This assumption, which is one of the strong points as well as perhaps the greatest weakness of the Program, is that action to solve the problem must originate at the local level. Certainly no program to combat underemployment will be successful without the the support and cooperation of the people who are underemployed. Nevertheless, it is unreasonable to assume that local people coming together to discuss their problems can in some miraculous way lift themselves by their own bootstraps. When emphasis is placed upon the local level, the opportunities examined in promoting economic development are likely to appear bounded by economic conditions at the local level. Local leaders cannot be expected to have the same degree of knowledge of conditions outside their local areas as within the areas. Furthermore, vested interests in industrial development of local areas are great in many instances, and migration of people from those areas is likely to be discouraged.

If the Rural Development Program is to be effective in promoting long term economic growth for the nation, it must be focused upon an area larger than a county and direction must be given to the program by per-

[12] C. E. Bishop, "Approaches to Rural Development," *op. cit.*

[13] V. W. Ruttan, "The Potential of Rural Industrialization in Local Economic Development," Chap. 12 in *Agricultural Adjustment Problems in a Growing Economy*, Iowa State College Press, 1958.

sons who are familiar with opportunities extending beyond individual county boundaries.

Community development

The community development activities of the Rural Development Program have been quite varied in nature. In general, these activities have concentrated upon improving the attitudes of local people about changing economic and social conditions, improving local schools and other local institutions, and instilling a feeling of pride in people with respect to their communities. Changes of this kind are a necessary part of successful rural development. There is a danger, however, in conducting activities of this kind on a strictly local level. Sociological and economic development may require alteration of the values of people in low-income areas. Forces leading to the alteration in values are not likely to stem from the small local areas in which the Rural Development Program is now being conducted. For example, witness the problems encountered in consolidating local schools. Positive action to alter the values of people rests upon the willingness of one to assume the position that there are superior sets of values and that particular environments exist that are consistent with the acquisition of these superior values. Although alteration of values is a slow and painstaking process at best, the rate of alteration likely will be slower when only indigenous forces are used for accomplishing this change.

Summary

From its outset, the Rural Development Program has lacked direction. When the program was established, it was decided that it would be decentralized and that no agency would be established to administer the program. The administrative structure for carrying out the program has been constituted at all levels by committees, and, to the best of my knowledge, no person on these committees has been assigned to a leadership role and given responsibility for carrying forward the program. Consequently, the Rural Development Program is not well defined. Its goals are too general to permit measurement of progress, and no one is responsible for seeing that economic opportunities are critically evaluated and that action is taken to exploit these opportunities. As a consequence of the type of organization that has characterized the Rural Development Program, there has been a sad neglect of the possibilities and responsibilities for the use of the powers of government to improve the lot of people in low-income areas.

The program has been so poorly organized and given such meager support as to appear that the nation is unconcerned over the welfare of its underemployed citizens. From the assistance given to date it appears as if

the Federal and state agencies have told underemployed people in low-income areas (1) that a problem exists in those areas, (2) to determine what the problem is if they can, and (3) to work out a solution if they can. This is hardly to be considered a contribution to the solution of the problem by Federal and state agencies. But, perhaps this is proper. Perhaps the underemployment problem can be solved by indigenous action at the county level. I doubt it. The fact remains that the Federal and state governments have much of the power to control the rate of economic development, even of limited areas. Certainly these powers should be used in a manner consistent with providing higher levels of living for underemployed families. Furthermore, if the nature of the underemployment problem is as I have described it, then underemployment cannot be solved by programs focused solely upon individual counties.

The Rural Development Program is a pioneering effort in that it explicitly recognizes that the fruits of progress have not been shared by large numbers of people in our society. The program focuses attention upon these people and upon the problems they face in improving their levels of living. A much more concerted effort will be required at the Federal and state levels, however, if the level of living of people in areas characterized by serious underemployment is to be equated with the level of living of people in other areas. I have tried to show that the rural development problem is a national problem and that it should be tackled on a national scale as well as at the local level. The most appropriate policies for solution of the problem, therefore, must be consistent with national economic and social development. It is a problem that is of sufficient magnitude to warrant public as well as private concern. It is one of the most difficult and complex problems facing rural America. There are no easy solutions. The problem certainly warrants the thought, research, and administrative direction currently given other less important problems.

DISCUSSION: THE RURAL DEVELOPMENT PROGRAM AND UNDEREMPLOYMENT IN AGRICULTURE*

ERNEST J. NESIUS
West Virginia University

My friend, Dr. Bishop, has done as well as he could with the subject given to him. As with any subject about which there is limited or no research, a speaker is forced to choose one or more of several alternatives.

*EDITOR'S NOTE: This Discussion paper is in the form in which it was presented at the meetings, based upon an advance draft of Dr. Bishop's paper. For reasons of time, the Editor prevailed upon Dr. Nesius to forego revision of it to take account of changes in the final version of Dr. Bishop's paper.

One alternative is to present what information is available about the subject and then devote the main part of the discussion to another subject which bears some relationship and about which there is some reliable factual information. Another alternative is to hypothecate a situation and then discuss it by examining all sides of the problem it creates.

Dr. Bishop has done some of both. I would not criticize him for it. I believe he had no other choice. There should be some information about the Rural Development Program and underemployment. However, if there is, it is not generally available.

Dr. Bishop sets up as the main question for addressing his discussion: "Is the Rural Development Program as it is now operating an effective program for combatting underemployment of labor in U.S. agriculture?" I believe that Dr. Bishop would agree he has not answered his question.

Dr. Bishop, along with many others, probably does not have a clear picture of what the Rural Development Program is. This is to be expected because rural development has about as many different faces as there are programs in the United States. The central element of similarity from state to state is that it is conceived as a program of activities under the sponsorship of State and Federal agencies, with the objective of alleviating distressed conditions in low-income rural areas. Implied is strong local leadership. From this simple objective, or perhaps it is an expression of need, different approaches have been applied.

When economists try to cast rural development all together within an economic framework, they are forced to omit much of the work that is done under the Rural Development umbrella. Similarly, when sociologists attempt to delimit the areas of interest into certain social situations, they, too, bog down. And so on with other disciplines. Therefore, any attempt by one discipline to evaluate the whole program is immediately subject to a wide margin of error. Dr. Bishop has attempted to avoid this pitfall by resorting to economic theory as applied to resource allocation and resource utilization. However, he couldn't resist a few broadsides toward the end of his paper.

Dr. Bishop makes several arguments which are worthy of repeating. He has an opinion with which I agree—that the lack of capital for transferring labor and other labor resources to new uses is not important.

Dr. Bishop takes a strong position as to the reason for a surplus of labor on farms, saying that, at the prevailing rates of return for farm labor, there is a surplus of potential workers who would immediately transfer themselves and their resources to other employment if jobs were available; thus, they would be quick to become nonfarmers. In fact, this point is the central one in the case he presents. Dr. Bishop makes the point that if the rate of growth in the total economy were sufficient to absorb the labor released from agriculture as rapidly as farmers are able

to free this labor, then labor would migrate to nonfarm jobs at the rate they became available. Dr. Bishop implies that if the rate of economic growth were stepped up, the surplus farm labor problem, as well as the surplus agricultural production problem, would disappear. Apparently there are other groups in our economy that believe this, because the rate of national economic growth has become a matter of political concern.

One factor that Dr. Bishop overlooks in his three conditions of mobility and equalizing the real return for labor is the "frozen" or stalemated potential wage earner who would not move for any one of the three situations he lists as characterizing the reasons for underemployment. A cross-sectional survey of a community where underemployment prevails would uncover many sticky factors that would cause potential wage earners to be "frozen" or stalemated in the community. They can't be assumed away or wished away. Those dealing with any program such as Rural Development must be concerned with such people.

Dr. Bishop recognizes the importance of converting the unskilled and semiskilled workers into skilled workers through better educational programs which, in effect, calls for additional investment in education.

Dr. Bishop very properly recognizes that the county is not an appropriate economic unit; rather, consideration should be given to geographic areas of similarity.

There are a few statements I cannot pass by without a comment. In the first part of the paper, Dr. Bishop says "If the Rural Development Program is to be successful, it must result in increased productivity and increased returns for labor of families now living on small farms." In economic terms, this is basically true. However, it doesn't necessarily follow that public approval of a program is recognized by one criterion, namely, productivity and its consequences. More important, frequently, is the method chosen to accomplish the goal accepted as desirable.

Another statement Dr. Bishop makes is that "Labor stands ready and willing to transfer from farm to nonfarm employment at prevailing . . . relative rates of return for labor." As a flat categorical statement, this probably is not true. Suppose the available jobs were 2,000 miles distant. All assumptions of perfect mobility are unrealistic. No doubt more people would move if more jobs were available.

Another quotation from Dr. Bishop: "This policy, however, of developing currently existing metropolitan areas as sources of employment for labor currently employed in agriculture runs counter to one of the basic assumptions underlying the Rural Development Program." Dr. Bishop has missed two points. One is that those who are concerned with rural development would be delighted with the prospect of linking together the problem of the declining community with the opportunity in the metropolitan community. As a matter of fact, this is a plane to which

most of us who are concerned as agencies have not been able to elevate our efforts. The other point missed by Dr. Bishop is that a reasonable argument can be made for the belief that if local groups had the full information relative to their own future and to the opportunities in other employments, they could come to some conclusion other than believing they could "in some miraculous way lift themselves by their own bootstraps." Dr. Bishop seems to assume that all local people, in discussing their problems, can accept only the answer of keeping people in the community.

Dr. Bishop considers it a weakness of the Rural Development Program that no single agency has had responsibility for carrying it forward. While much can be said in supporting such an argument, I believe Dr. Bishop is overlooking a few basic factors in the Rural Development Program. One of the strong points about the Rural Development Program is in agency cooperation, both state and federal, private and tax-supported. In some counties there are as many as 60 different county, state and federal agencies, tax-supported and member-supported, who, in some way or other, claim to be interested in the general welfare of the people in the county or area. The central issue here is whether you propose to whip the agencies into some predetermined direction by top-side action or whether you create a situation for them to adjust their programs to the continually changing and evolving future. Certainly the effort, so far, to accomplish the latter has been, admittedly, exploratory, and with practically no additional resources.

The first existing agency that is officially set up to coordinate and bring together all other agencies may be receiving the "kiss of death." Furthermore, any super agency created to coordinate all agencies of government—federal, state and local—is more than likely to be pretty well checkmated before it becomes effective, unless it is blessed with unlimited resources. The big opportunity is in learning how to work together on common problems, using the existing resources of the agencies. Their programs should be modified, reoriented and, in general, built around similar objectives and goals. Coordinated efforts by agency leadership will yield very high returns. I agree with Dr. Bishop that the coordination function needs to be more clearly obvious.

Dr. Bishop's paper is a very good discussion piece. It opens up many ideas which, if intelligently pursued, could only lead to positive efforts. He is to be commended for presenting a provocative paper.

THE ROLE OF INVESTMENT IN HUMAN AND COMMUNITY CAPITAL*

LEE R. MARTIN
University of Arkansas

The purpose of this paper is to convince readers of the validity of two economic conclusions: (1) the most important reason for low incomes in the South (and especially among the rural population) is inadequate human and community capital formation; (2) the most promising avenues for raising incomes of households in low-income areas are more nearly optimum levels of investment in human and community capital, and higher rates of growth in the economy.

ONE ASPECT of the present economic environment needs to be emphasized at the outset. Some discussions of low-income areas either assume that all of society's resources are fully employed or do not take explicitly into account the fact that resources are not fully employed. That society's human resources are less than fully employed is easy to demonstrate. In 1959 unemployment averaged 3.8 million; 3 million is a conservative estimate for the number of underemployed rural families. If 1.8 million of the unemployed could be employed without intolerable inflationary pressure, and if one-fifth of the underemployed households have a second member anxious to work, then employment could be increased by 5.4 million, an increase of 8.2 per cent. Federal Reserve Board indexes of physical volume of production for different manufacturing industries for 1958 and 1959 indicate that there was a great deal of underutilized production capacity (especially in steel, automobiles, paper and petroleum).

Low Levels of Human and Community Capital Formation in the South

Data on annual inputs of human and community capital are available but not easy to interpret. The theoretical framework for understanding human and community capital is so undeveloped that few economists consider these expenditures as capital investments at all![1]

Available measures of human and community capital formation (Table 1) indicate that states in the South are below (often much below) the

* Published with the approval of the Director, Arkansas Agricultural Experiment Station. The author acknowledges suggestions from James H. White and Calvin R. Berry. Errors of fact, logic or judgment are the sole responsibility of the author.

[1] For a brief summary of the reasons for including some expenditures on human resources and communities in the category of investment capital, see the section entitled "Public Capital" in the paper by Lee R. Martin, "Changes in Capital Productivity and Over-all Capital Problems, by Size and Type of Farms, and by Region," *Capital and Credit Problems in a Changing Agriculture*, to be publ. by Iowa State Univ. Press.

TABLE 1. RECENT DATA ON HUMAN AND COMMUNITY CAPITAL FORMATION IN THE UNITED STATES AND IN THE SOUTH, AND SOME MEASURES OF THEIR EFFECTS[a]

Item	Interquartile range for the South[b]	U.S. average
Expenditure in dollars per capita in 1957 for:		
State institutions of higher learning	8–11	12
Local schools	45–59	70
Highways	34–48	46
Public welfare	15–21	20
Health and hospitals	11–15	19
Police and fire protection	6–9	14
Natural resources	4–6	6
Sewers, sewage disposal and other sanitation	4–7	9
All general purposes	155–204	237
Public school expenditure, 1958–59, in dollars per pupil in average daily attendance	200–277	350
Average salaries of teachers, supervisors and principals, 1958–59, in dollars	3350–4606	4939
Average number of days attended per pupil enrolled in public schools, 1953–54	152–159	159
Ratio of total public and private school enrollment, 1955–56, to school-age population, 1956	.88–.92	.96
Ratio of total college enrollment, 1956, to number of high school graduates, 1954	1.6–2.3	2.6
Percentage of population, 18–34, enrolled in college, 1955	5.2–6.5	7.3
Percentage of the 1950 population, 20–64, that was in the civilian labor force	65.2–69.7	68.8
Percentage unemployment was of the civilian labor force in 1956	3.43–4.36	4.72
Percentage of the 1950 population that was rural farm	21.1–33.1	15.3
Percentage of the 1950 population that was not white	12.8–32.1	10.5
Percentage of 1950 population, 25 years and older, with 4 years of college or more	3.8–6.0	6.0
Percentage of 1950 population, 25 years and older, with 4 years of high school or more	21.2–28.3	33.4
Percentage of 1950 population, 25 years and older, with 8 years of schooling or less	53.2–61.2	47.0
Outmigration rate in percent, based on 1950 population	22–32[c]	26
Inmigration rate in percent, based on 1950 population	12–22[d]	26
Percentage of forwarded Selective Service registrants rejected at preinduction and induction examinations, 1948–57	43–59	40
Per capita income in 1958	1359–1674	2057
State and local revenue in dollars per capita in 1957 from:		
Federal government	21–28	23
State and local property taxes	28–42	75
State and local nonproperty taxes	78–89	94
Charges and miscellaneous general revenue	24–37	32
All general revenue	151–199	224

[a] States in the South are Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, Arkansas, Louisiana, Texas and Oklahoma.

[b] Parameters for the fourth and eleventh ranking of the fourteen Southern States.

[c] The average for the South was 28 percent.

[d] The average for the South was 18 percent.

Source: computed from Lee R. Martin, *Investment in Human Resources and Economic Development*, ms. subm. for publ., tables 7, 14, 16, 17, 18, 19, 20, 21, 25, 26, and 45.

U.S. average, even when the southern states are included in U.S. averages. Expenditures per capita in 1957 in the states of the South were considerably below those in the nation as a whole for: state institutions of higher learning, local schools, highways, public welfare, health and hospitals, police and fire protection, natural resources, sanitation, and all general purposes. Discrepancies were even larger in 1958-59 for public school expenditures per pupil in average daily attendance, and for average salaries of teaching personnel. The number of days attended per pupil was less in low-income states, as was the ratio of total school enrollment to school-age population. The percentage of college-age population enrolled in college was also less in the South. Thus two characteristics of inadequate human capital formation in the South are relatively less school attendance at all ages, and fewer days attended by those enrolled.

Inadequate human capital formation in the South shows its effects with low percentages of the adult population with 4 years of college or more and with 4 years of high school or more, and high percentages with 8 years of schooling or less. Inadequate human capital probably was responsible for rates of outmigration from the South too low to keep human resources in balance with other resources. Inadequate human and community capital formation was responsible for too low a rate of immigration (particularly in quality) to result in optimum use of other resources in the South.

Rejection rates by states for Selective Service registrants are dramatic evidence of the effect of inadequate human capital formation. Incomes per capita that are far below the U.S. average testify eloquently to the effect of less than optimum human and community capital.

Ways in Which Human and Community Capital Affect Personal Income

So far, the effect of human and community capital on personal income per capita is only an assumption. The validity of this assumption may be seen more clearly by examining the structure of income generation closely to see how inadequacies in these capital forms bring about low incomes.

Natural resource endowments of different states or other geographic units often vary considerably. If neither human and capital resources nor final goods and services could move freely between units, then considerable differences in natural resource endowments would be associated with considerable differences in incomes per capita.

In an economy in which human and capital resources, and final goods and services do move freely, large income differences would not be expected among geographic units. As technological change brings rapid changes in the value and composition of an area's endowment of natural resources, human and capital resources would move between areas on a

sufficient scale to keep incomes of similar productive factors in a rough parity with each other.

Economic theory implicitly presumes no significant differences among areas in the quality of human resources. Table 2 shows that technological developments have brought striking changes in the experience and training needed in a highly developed economy. The absolute requirements in terms of training and experience have risen sharply, and the rise seems destined to continue. The human resource surplus noted above reinforces the importance of education. An economic activity whose needs for skills are not very demanding will choose the best educated and most experienced of available workers. With nearly 8 per cent of the labor force

TABLE 2. ESTIMATED CHANGES, 1955 TO 1965 AND 1960 TO 1970, IN NUMBERS OF WORKERS REQUIRED, BY TYPE OF WORKER, AND AVERAGE SCHOOLING EACH TYPE OF WORKER HAD IN 1959

Type of worker	Changes required		Average schooling, 1959
	1955 to 1965	1960 to 1970	
	per cent		*years*
Professional and technical	+37	+42	16.2
Proprietors and managers	+22	+23	12.4
Clerical and sales	+27	+25	12.5
Skilled craftsmen	+24	+23	11.0
Semiskilled operatives	+22	+18	9.9
Service workers	+13	+24	9.7
Laborers	− 4	0	8.6
Farmers and farm workers	−15	−17	8.6

Source: *Our Manpower Future, 1955–65*, U.S. Dept. Labor, Washington, D.C., 1957; *Manpower—Challenge of the 1960's*, U.S. Dept. Labor, Washington, D.C., 1960.

estimated to be unemployed or underemployed, even marginal economic activities can and usually do exercise considerable choice among the workers available to them. That this selectivity is operating is indicated in Table 3 by the percentages of different educational achievement groups that were unemployed in 1959. An individual with less than high school graduation was nearly 3½ times as likely to be unemployed as one with some college education; an individual with only a high school diploma was nearly twice as likely to be unemployed as one with some college. Experience would lead one to suppose that the effects of inadequate human capital might be even greater in generating underemployment than is shown in Table 3 for unemployment.[2]

In areas with a large volume of resources made redundant by technological change (such as in many of the farming areas of the United

[2] For further discussion of the relation of human capital to resource underemployment, see Lee R. Martin, "Alternative Uses for Resources Displaced by Agricultural Adjustments," *Southwestern Soc. Sci. Quar.*, Suppl. to Vol. 41, 1960.

States, especially in the South), economic theory would lead us to expect outmigration of human resources to other areas where employment opportunities are better. Actually, the migration may not take place on a large enough scale for income parity because better employment opportunities may not exist anywhere else for the poorly educated individuals, especially for those without qualifying work experience. So one type of adjustment—outmigration from low-production areas—that might lessen the income disparities among areas is considerably reduced in force by public policies that result in a level of economic activity that leaves 1/13 of our labor force unemployed or underemployed.

There are other adjustments that might take place. One has only to drive through low-production areas to see resources (farm and nonfarm) that could be used more effectively. More effective use would generate

TABLE 3. EFFECT OF EDUCATIONAL ACHIEVEMENT ON LIKELIHOOD OF UNEMPLOYMENT, 1959

Educational achievement group	Percentage of total group that was unemployed in 1959
Less than high school graduation	8.6
High school graduation	4.8
Some college education	2.5

Source: *Manpower—Challenge of the 1960's*, U.S. Dept. Labor, Washington, D.C., 1960.

more income in the area. Technology has made efficiency depend more and more on complicated production methods and complex production organizations. These efficient methods and organizations are likely to be beyond the present capacity of many low-production areas and their institutions.

One immediately wonders why outsiders have not come into these areas in order to develop these underutilized resources. Some development of this sort has occurred, and to the benefit of the areas. Unfortunately, many low-production areas are—because of too little human and community capital—quite unattractive to the talented outsiders who might provide the human qualities needed for more effective use of area resources. This is shown by the generally low rates of migration into southern states (except Florida).

Talented humans are needed in low-production areas not only in connection with the location of new economic activities, but also to assist in expanding and raising the efficiency of existing economic activities. While there are economic activities that have a narrow range of optimum locations (mostly, resource-oriented and a few market-oriented economic activities), a large number could be competitive at many loca-

tions with good access to transport, with other external economies, and with certain qualities of human resources.

The concentration of economic power into the hands of a few hundred large corporations makes the probability high that new plants will be branches of these corporations. Low-production communities can in effect furnish for these plants only a physical site and some not very highly skilled human resources. Most of the skilled personnel would have to be brought into the community. Talented and experienced individuals are in the elite group of our society—a group with numerous attractive and lucrative employment opportunities. Few of these families would consider residing in low-production communities which are unappealing because of inadequate human and community capital. Corporations are reluctant to locate plants in such communities because of anticipated personnel difficulties *and because* other locations are available without these obvious disadvantages.

Human and community capital has still another effect. Communities with the benefit of high levels of human and community capital formation in the past are potentially more efficient locations for economic activity. Not only will these communities be attractive to indispensable personnel but they can already provide the inputs and specialized services that are quite important to an economic activity. These external economies are just what a progressive area can provide immediately to a new plant; the plant would have to provide these services for itself in a low-production area. The existence of these external economies makes the needs for investment capital less in a given location, and makes unit operating costs less. Is it any wonder that low-production areas have considerable difficulty in obtaining new economic activities, particularly high-income activities?

Low-production areas also seem to have considerable difficulty in expanding existing economic activities. There is good reason for believing that at least a part of this difficulty is due to inability to obtain highly-skilled personnel and to the absence of external economies. In other words, low levels of human and community capital formation make the expansion of local enterprise quite difficult.[3]

Demand for Underemployed Resources

The implication of the preceding section is that low-production areas could employ their resources better if there were more human and com-

[3] For a much more detailed discussion of different aspects of the location of economic activity, particularly as they affect low-production areas of the South, see Lee R. Martin, *Investment in Human Resources and Economic Development,* ms. subm. for publ., chap. 3.

munity capital in the areas. Better resource employment would take place in a given area either through the use of underutilized resources to produce goods and services that would add to national product or by reducing the proportion of the area labor force in the unemployed and underemployed categories without increasing the national product. The latter procedure would shift the incidence of unemployment and underemployment to other areas. From the viewpoint of society, the better alternative would be to use redundant resources to obtain a greater national product.

Which course a low-income area should follow depends on whether demand for additional goods and services exists or can be created. Demand for additional labor is a derived demand, derived from the demand for additional goods and services. Are there goods and services that the American society needs badly enough that their production would generate greater incomes for unemployed and underemployed resources? The more detailed arguments that there are such goods and services are found elsewhere.[4] Briefly the conclusion is that greater volumes of the following types of goods and services would increase aggregate welfare:

1. Privately produced goods and services for low-income households.
2. Higher levels of human and community capital formation, particularly in low-income areas.
3. Better defense posture, both in quantity and quality.
4. Much greater volumes of aesthetic facilities and services.
5. A minimum standard of living for economically unemployable individuals.
6. Goods and services to assist in raising the economic growth rates of underdeveloped nations.

There can be little disagreement with the view that low-income households, including those with economically unemployable members, would purchase and consume a larger volume of private and public goods and services, if these households had more purchasing power. Investment in human and community capital would qualify unemployed and underemployed workers and communities for higher levels of economic activity. Many of the leaders most closely associated with defense problems during the last ten years feel quite strongly that the need for additional expenditures on defense is great and urgent. Increases in the volume of aesthetic services made available to all our people are also needed, particularly in low-income areas. Not only is the aesthetic level of a civilization a good criterion of its intrinsic worth, but aesthetic experience helps to develop the imagination, vision and dedication needed so badly to go along with the more highly prized technical expertness. In summary, one

[4] See the section entitled "Demand for Resources Redundant to Agriculture" in Lee R. Martin, "Alternative Uses . . .," *op. cit.*

can say that there are many types of goods and services that would contribute greatly to individual and total welfare.

Social Cost of Producing a Larger Volume of Goods and Services

In the preceding section, the need was demonstrated for stepping up the rate of economic growth in order to make a larger volume of private and public goods and services available. Earlier, the existence of unemployed and underemployed human resources and of other underutilized resources was shown. How can the need for greater production be brought together with the potential for greater production?

If the needed goods and services are examined, they are seen to be largely of one type. Not only are they mostly services but principally services produced in the public sector. The responsibility for human and community capital formation rests largely in the public sector. Defense is entirely assigned to the public sector. Aesthetic services are largely produced by public agencies, although private philanthropy plays an important role. A minimum standard of living for unemployables will have to be largely a project for society as a whole, although again private philanthropy and religious groups could have a vital part here too. Even the additional private goods and services for low-income households could be financed by government. If society decided to increase the rate of growth sufficiently to make available the additional goods and services indicated as Types 2, 3, 4, 5 and 6, demand for labor would be increased enough to provide employment for many of the potentially employable individuals. This assumes enough investment in human capital to qualify these low-income individuals for employment that now exists or that will be created in making additional goods and services available.

Recognizing that a higher economic growth rate must come about largely through expanding the level of economic activity in the public sector is consistent with other evidence on long-run changes in the demand for goods and services.[5] There are indications that after World War II the relative demand for services resumed its long-run upward trend, and that relative demand for government services is growing even more rapidly than for all services. The percentage of national income originated in the public sector increased 23 per cent from the average of 1930 and 1935 to the 1951-57 average. This relative increase in the value of product took place in spite of a decline of 20 per cent in the index of average earnings of government employees with the earnings of all employees as the base. The relative increase from 1929-35 to 1951-56 in the percentage of total workers who were in government employment was 65

[5] For a much more detailed discussion of these changes, see Lee R. Martin, *Investment in Human Resources . . ., op. cit.*, chap. 3.

per cent. Strong and unrelenting pressure against increases in public spending has been kept on by many leaders in our society. In spite of these pressures, the need for increasing the volume of public services has seemed clear enough to the majority of our citizens that increases in public services have occurred, even though partly at the expense of depressed earnings in the public sector (particularly in education).

Assuming that there is a felt need for an expansion of economic activities in the public sector, is such an increase possible? If it is possible, what is the social cost, that is, what other goods and services would have to be given up in order to obtain a larger volume of public services?

If all the nation's resources were indeed fully employed in producing the GNP in its present composition, then an increase in public services could be obtained only by diminishing the volume of private goods and services (either for consumption or for investment). Public agencies would have to bid factor prices up enough to take the required factors away from existing uses. But, if there are unemployed and underemployed resources (including underutilized capital goods and services), then factor prices would not need to rise and the social cost of additional goods and services would be much less than conventional methods of accounting would suggest.

Two crude illustrations may be instructive. In 1959, 65.6 million workers produced a GNP of $479.5 billion, of which $97.3 billion (20.3 per cent) were represented by government purchases of goods and services.[6] If the 8.2 per cent increase in employment mentioned earlier could be used to produce an 8.2 per cent increase in GNP, this would be an increase of $39.3 billion, to a GNP of $518.8 billion. If the same percentage of GNP were available for government expenditure, this would make $105.3 billion available for public purposes, an increase of $8 billion without changing tax rates. This would make possible an increase of $45 in expenditure per capita. Increases of this magnitude would bring rates of human and community capital formation nearer optimum.

If we became serious about a better defense posture, and went even further by deciding to offer our population increased opportunities for aesthetic satisfactions, we might increase tax rates enough to yield for the public sector 22 per cent of the GNP, instead of 20.3 per cent. This would make available an additional $8.8 billion ($49 per capita) for more defense and more aesthetics. Even after this relatively greater allocation to the public sector, more income would be available from the higher GNP for the purchase of privately produced goods and services than before. Of the 1959 GNP, $382.7 billion went for personal consumption and gross private domestic investment; out of a larger GNP of $518.8 billion, ap-

[6] Data from *Survey of Current Business*, Jan. 1960.

proximately $404.7 billion would be available for these purposes, an increase of 5.7 per cent.

Let us turn from a macroeconomic illustration to a microeconomic one. Suppose an underemployed farm family (with one worker) receives net income of $1200 per year. Suppose the breadwinner could be trained to produce $6000 net worth of services, for which he would receive a net income of $6000; then from society's viewpoint the first approximation to the marginal social cost of the $6000 worth of additional services would be $4800 (assuming the family's farm produce was in surplus). If the $1200 in net farm income came from the sale of farm products valued at $1800 and the annual cost of owning and storing $1800 worth of surplus farm products is $135, then the second approximation would be $4665. If the family consumed 65 per cent of their personal income before taxes, this would lead to consumption of goods and services valued at $3900, an increase of $3000. If the marginal cost of producing consumption goods worth $3000 is only $2000 (because fixed costs are already being covered in many of the consumption goods industries), then the third approximation to marginal social cost would be only $3665. If taxes paid by the family went from $300 to $900, then the fourth approximation would be $3065.[7] An economic system that can increase useful output by $6000 with an outlay of only $3000 is doing very well indeed! The same kind of estimate of social cost could be worked out for an unemployed worker drawing unemployment compensation.

What must be done to step up the rate of growth enough to provide employment for the unemployed and underemployed who have both the potential and the desire for employment? First, society must change its attitudes on public spending enough to allow a larger proportion of GNP to be generated in the public sector. This includes a changed attitude toward taxes. Second, tax rates need to be changed to allocate a higher proportion of GNP to the public sector. Third, money should be created and expended on the types of goods and services mentioned earlier. If these expenditures are made carefully, there should be little question of increasing inflationary pressure due to excessive purchasing power. The money created could come either from direct creation by the government, or from bank creation with the government borrowing the created money from banks. Fourth, to the extent that loanable funds are plentiful in the economy, borrowing funds to use for investments that will produce valuable services throughout the life of the loan would be reasonable. Fifth, first priority for additional public expenditure should go to human

[7] The present value of $3000 a year for 20 years, discounted at 6 per cent, is $34,975. All of the beneficiaries together—individual, county, state and nation—could afford to pay as much as $34,975 in order to obtain the additional services. The cost of training would be a very small fraction of this amount!

TABLE 4. ESTIMATED EXPENDITURE ON SELECTED CONSUMPTION ITEMS, AND ON PUBLIC EDUCATION, U.S. AND ARKANSAS, 1957–58

Item	Consuming area	Year	Unit of measure	Production per capita	Arkansas price per unit	Estimated expenditure per capita
						dollars
Production of:						
Distilled spirits	U.S.	1958	gallon	3.3	20.00	66.0
Beer	U.S.	1957	12 oz.	174.0	0.20	34.8
Small cigarettes	U.S.	1958	pack	135.0	0.25	33.8
Large cigars	U.S.	1958	number	36.0	0.10	3.6
Sales of gasoline	Ark.	1958	gallon	333.0	0.30	99.9
Expenditures on:						
State institutions	Ark.	1957	—	—	—	11
of higher learning	U.S.	1957	—	—	—	12
Local schools	Ark.	1957	—	—	—	40
	U.S.	1957	—	—	—	70

Source: *The World Almanac*, 1960, pp. 689, 694, and 697; Lee R. Martin, *Investment in Human Resources . . . , op. cit.*, Table 21.

and community capital formation, and to defense expenditures. These expenditures would increase the purchasing power of low-income households enough to call forth a greater volume of privately produced goods and services. Eventually, the combination of GNP increasing at an increased rate and higher tax rates would yield enough public funds for a higher standard of living for unemployables and for a greater volume of aesthetic services. Expenditures on human capital are needed soonest in order to raise individual productivity enough to support an increased rate of economic growth.

Being for higher taxes now carries the same moral stigma as not being against sin. What is generally overlooked in the emotionalism involved in tax discussion is the magnitudes. Table 4 shows some rough calculations made to indicate the order of magnitude for some human capital expenditures and a few of the consumption items that compete with human and community capital formation for funds. Here it can be seen that relatively large increases in human capital formation would not impose great hardship on low-income states. Table 1 shows that southern states could increase considerably the revenue per capita from property taxes, from transactions taxes and from chargeable services without reaching the U. S. average.

Summary

This paper argues that there are alternative uses for resources now redundant to our economy (and especially for human resources redundant to agriculture). These include the production of:

1. Goods and services for low-income families.
2. Items needed for human and community capital formation.
3. Goods and services needed to provide a better national defense posture.
4. More aesthetic facilities and services.
5. Goods and services to provide a minimum standard of living for unemployables.
6. Goods and services to assist in the economic development of underdeveloped countries.

Underutilized resources are not being used to produce these needs because of inadequate human and community capital formation, and because of attitudes toward production in the public sector. Most of the underemployed and unemployed are not qualified for the jobs that are available in a period of rapid technological change. Too little community capital keeps low-income communities from obtaining additional economic activities that would provide employment for their unemployed and underemployed. The volume of funds for bringing human and capital formation nearer optimum will not require great sacrifice even from low-income states. The existence of underutilized resources (including industrial production capacity) reduces by nearly one-half the marginal social cost of providing for these needs. But the most important step—the thread that will begin to unravel the low-income tangle—is investment in human resources.

DISCUSSION: THE ROLE OF INVESTMENT IN HUMAN AND COMMUNITY CAPITAL

RAJ KRISHNA
University of Chicago

I propose to confine my remarks to the potentiality of education as a growth promoting factor, so forcefully emphasised by Prof. Martin. It is evidently difficult to question Prof. Martin's central recommendation that more money be spent on education (and other social overhead facilities) in the low-income areas. But one must feel sceptical about the kind of monism that seems to pervade Prof. Martin's paper, and try to put education—and different kinds of education—in some perspective as a growth factor vis-a-vis other factors.

It is by no means clear from the historical record that general mass education is an essential precondition of economic growth. The statistics showing high correlation between the growth of per capita income, the decline of illiteracy, the growth of schooling etc.—international or inter-

regional—usually cited to establish the case for greater educational outlays for the sake of growth, tell us nothing, by themselves, about the causal or sequential order between these developments. Great Britain had reached a Rostowian technological maturity by 1851, with 31 percent of its males and 45 percent of its females signing the marriage register by mark. France went into the "take-off" (1861) with at least 32 percent illiteracy. "In Scandinavia, popular education was fostered early, before industrial and commercial development, whereas the process in the Netherlands (as in England) was the reverse . . . Historically, countries vary considerably in their relative timing of the growths of literacy and of industrialism." (UNESCO, World Illiteracy at Mid-Century, pp. 182-187.) In the colonial areas of the world, again, high mass illiteracy still persists but Western investors and entrepreneurs erected large and lucrative islands of plantation, mining and industrial growth amid a sea of cheap and illiterate labour, wherever the natural resource, demand and political conditions have been favourable. We cannot, therefore, assume that general mass education is a prerequisite of industrial growth. The existence of a small, educated entrepreneurial, managerial and technical elite is, of course, a prerequisite, though we must note again that in some parts of the world some of the boldest entrepreneurs in the early stages of growth have been illiterate, and much of the technical, managerial talent can be imported.

It seems to be true that more often growth has preceded mass education than the other way about. The order can, of course, be reversed, and has been reversed in many countries. Mass education may not be an absolutely essential prerequisite of growth but it can act as an accelerator. But then it is necessary to consider what types of education accelerate what precise components of the growth process in what precise manner.

Research on this question is badly needed. But some of the available evidence suggests caution about hasty assumptions about the effects of education. The measures required to deal with the low-income problem generally fall in three main categories: (1) measures to accelerate outmigration, (2) measures to help the improvement of farming, and (3) measures to foster local industrial growth. How does education influence these adjustments? Regarding migration, Prof. E. J. Long suggests, on the basis of Tennessee studies, that

> educational levels were found not to be significantly related to migration into near-at-hand, conventional employment opportunities. Nor did education importantly influence migration into distant job markets, once the migration channels had been smoothly worn by early migrants from the community . . . (but) it had been the more educated people who had pioneered the movement before the war.

As for the effects of education on farm income, Prof. Long argues that it is difficult to isolate them

> because in most areas the farm people who have been given the best education have also inherited the best farms and the most operating capital. And in certain areas such as eastern Wisconsin exactly the opposite is true.

(Low Income Families, Congress Hearings, Nov. 1955, p. 431.) Thus we cannot take it for granted that general mass education always causally accelerates migration or directly raises farm income. It remains true, however, that the educated are more likely to respond to the new economic opportunities that arise than the uneducated. (Long, *op. cit.*)

Data about median school years completed by occupation groups shows that in 1950 more than two thirds of the employed males (22-74 years of age) had completed only elementary school years (median school years 8-9); another quarter had only completed high school years (12): these were the clerical and sales workers and managers and proprietors; and only the remaining one eighth, the professional elite, had completed college years. It is arguable that this picture of the educational equipment of the labour force overrates the level of education "strictly necessary" for occupational performance. Except in the case of nonfarm white-collar workers it is not clear that less general schooling would not "suffice." And it is known that though many categories of workers are classified as "craftsmen" and "skilled" due to the persistence of old classifications, many of them may be just button-pushers and machine-minders, with very simple manipulative muscular skills. A priori one would expect that, if "skill" is properly defined, an economy progressing, through increasing mechanisation, toward automation would, by and large, require simple manipulative skills in its operatives and very high skills in the top elite. If the actual observed level of general schooling is what it is it may not be primarily due to production requirements in the narrow sense, but simply because of the progressive realisation of the educational ideals of democracy. If employers demand a certain level of schooling in their operatives it may not be because less-schooled workers could not mind the machines but simply because that level has become general and they might as well insist on it; or because it is one of their or the trade unions' ways of keeping certain types of cheap labour from employment even if its physical productivity per dollar paid may be comparable. For all these reasons one has to be very sceptical about arguments which, on the basis of empirical occupation-education data and their projections, deduce simply that in order to create employment for the unemployed or raise the income of the poor what is required, above all, is more schooling of the masses.

It is probable that in agriculture as well as industry a large number of

operatives with very different levels of schooling have the same marginal value productivity and that the higher productivity of some workers is due to factors other than schooling; but it is (wrongly) imputed to schooling because the main data available about the "skill" of workers relates to years of school completed. Years of school completed may be a very misleading index of the specific job skills the workers have. It may lead, on the one hand, to an overestimation of the importance of schooling as a productive factor, and, on the other, to an underestimation of the effective productive skill the labour force carries; for a great deal, perhaps the bulk, of this skill might have been acquired on the job, or from extension services or from the various part-time education outfits or from cheap literature or the programmes of the media of mass communication. None of this knowledge, though it is directly relevant to productivity, is usually indicated by years of schooling.

Only when detailed research into the differential productivity effects of different kinds of knowledge acquired from all sources has established some firm conclusions can we know what kinds of outlay on the dissemination of knowledge (not necessarily in schools) promise the best and quickest results in income per dollar of cost. We may find that knowledge derived from more years of schooling may not be the most productive. We may also then acquire the proper sense of proportion about the role of general education vis-a-vis other factors—such as the supply of natural resources, capital, and entrepreneurship, and the imperfection and discrimination in the labour market—as factors inhibiting growth. It may indeed be true that a labour force with a minimum of schooling can raise its income more and faster if physical capital could be found for it, enterprise could be imported, and competition in the unskilled labour market were freer.

The computation of returns to knowledge is a relatively new and promising field of investigation. A few of the results of one or two recent studies suggest interesting conclusions. Prof. T. W. Schultz's computations in a recent paper Education and Economic Growth, Unpublished paper, Department of Economics, University of Chicago) show that the ratio of additional life-time earnings to the cost of education was about 40 for elementary education and 10 for high school and college education, during the 50's, and that the ratio for high school education has fallen while that for elementary education has risen since 1939. Prof. G. J. Stigler has also computed and compared the present value of earnings of persons with different levels of schooling.* These computations are admittedly open to the criticism of mis-imputation referred to above. As Prof. Stigler says:

* "The Economic Theory of Education," Unpubl. paper, School of Business, Univ. of Chicago.

they attribute to formal education the additional earnings which are also due to greater native ability, better health, stronger ambition, and greater tenacity of purpose—all of which are surely correlated with the level of formal education completed by adults. Even if one corrected the figures only for such elementary characteristics as intelligence quotients and fraction of time in ill-health, it is certain that the differentials in earnings due to formal education would be much reduced and they might be wholly eliminated. (*Op. cit.*, p. 8.)

But subject to this reservation (as also the neglect of the contribution of knowledge from non-school sources and on the job) it is apparent that what pays most, and is therefore needed most from the point of view of money returns, is elementary education—presumably because the leap from illiteracy to the world of the written word widens horizons and releases the 'economising' spirit, if demonstration effects are not powerful enough to do so. Advanced university education is needed only to train a small elite. Formal general high school education and college education for the masses is relatively less remunerative in economic terms. A society which is very poor in financial resources, and has no access to "foreign aid," and, therefore, "wished to get maximum returns from a small expenditure on education should have concentrated this education upon a small elite, rather than spreading it thinly over a much larger group" until diminishing returns were reached in this direction. (Stigler, *op. cit.* p. 10.)

These tentative conclusions (which only suggest the need for more detailed research) implicitly presuppose that education be regarded simply or mainly as a means to growth, and that the allocation of resources on the basis of measured returns would be in some sense more satisfactory than otherwise. But now we must ask the fundamental question: how far is it useful to treat education as a *means* to growth, and educational outlay as "investment"? It is true that individual educational and occupational decisions are influenced to a considerable extent by prospective life-time earnings compared with costs, to the individuals' own and society's economic advantage. And the economists' computations of comparative costs and returns of different kinds and degrees of education may make these decisions more informed. Also, there is much to be said for the extension of commercial lending for education in order to supplement domestic finance. Computed returns can help both borrowers and lenders to see their advantage more clearly.

But then the serious limitations of allocating public resources to education on the basis of computed returns must be recognised. Suppose certain types of schooling or knowledge-institutions bring a poor return; suppose, for example, that the net marginal return *strictly* attributable to schooling in industries producing material goods was negligible; would it be a decisive or even an important argument that the allocation of public resources to its cultivation or dissemination be discontinued? Would the return earned by resources transferred from schooling to some

other more tangible productive activity be an appropriate measure of the social return to education? Education is evidently one of those activities on the borderland of economics and non-economics, the return to society of the outlay on which is so subtle and "diffused" in time and space and the manner of accrual that the incremental earnings of identifiable groups of people (which is what we use as a measure of it) do not really measure it. This is even more seriously true of all those kinds of research and education which are apparently the most non-utilitarian—fundamental research and fundamental education. The true social return to these may be extremely difficult to measure; and so may be the loss if resources are allocated or not allocated to them on the basis of measured return. The social return from the existence of an Einstein or a Keynes or a Marshall may be infinitely greater than his life-time earnings. The acquisition and dissemination of knowledge are areas where the Pigovian divergence between the private and social return, and the divergence between the return which can be directly or indirectly brought "into relation with the measuring rod of money" and the real social return may approach dangerous proportions. And so a well-intentioned effort to obtain a better allocation of resources as a result of the computation of returns to knowledge relative to returns to other activities may unwittingly end up in a socially most unsatisfactory allocation because of the intrinsically faulty measurement (under-measurement in most cases) of the returns to knowledge. So long as the argument from measurable returns supports the socially desirable policy of allocating more and more resources to knowledge, it is fine; but the argument can cut both ways, and if on the basis of measured return it begins to be argued that many types of research and education must be curtailed or discontinued, the good-intentioned economist would be doing great harm.

I am sure that the notion of investment in man would not be pushed beyond safe limits. But it is necessary to beware of the danger that lies in taking measured returns to this investment too seriously.

On the whole it seems to be a pity that in a democratic society, in order to get more resources allocated to education, economists should show that they earn 10 percent; especially in the U.S.A. where the poor areas can be freed from the necessity of allocating very limited funds for education on strictly economic grounds, through liberal "foreign aid" from the vast surpluses of the whole country. The great public and private outlays on research and education in this country, in the past and at present, on the land grant college system, the public school system, and now on fundamental research, have not been inspired mainly by prospective returns but by farsighted statesmanship. This is how it ought to be. The category in terms of which education is best thought about is the category of "collective wants" or "public needs." It is as such that many of the great mas-

ters of our science thought about it. And as such it can be treated at par with defence, the return to which is not measured in ordinary economic terms, and the outlay on which is determined not by a strictly economic calculus but on grounds of public need as assessed by the socio-political process. I think in the long run education would get a better allocation of resources on this approach than as an investment only.

* * *

Postscript: These comments remain exactly as they were presented at the Conference at Ames. Since the Conference was held I have had the benefit of a discussion with Prof. T. W. Schultz on some of the issues raised here and I hope to discuss them further in a subsequent contribution.

MARKET POWER AND THE FARM PROBLEM

CHAIRMAN: R. B. ZOLLER, F. H. PEAVEY & CO., MINNEAPOLIS

THE SUPERIOR MARKET POWER OF FOOD PROCESSING AND AGRICULTURAL SUPPLY FIRMS—ITS RELATION TO THE FARM PROBLEM

ROBERT F. LANZILLOTTI
Washington State University

MARKET POWER has always aroused public fear and resentment in the United States. Under the philosophical bias of our society and the statutory mandates of our government, areas of uncontrolled private market power are not to be tolerated. We are committed to a pro-competitive public policy, with a clearly implied presumption that the compulsion of market forces be kept sufficiently strong to prevent or correct the accumulation of visible, unchecked private economic power. This is the general public policy toward business enterprise in the United States, although certain sectors of the economy (accounting for 15 per cent to 20 per cent of the national income) have been given limited legislative exemption, either expressed or implied, from the antitrust laws.

The problem of excessive market power has been a matter of general concern, with special attention from time to time given to the food processing and agricultural supply industries. Ever since the Granger Legislation of the 1870's, farmers have displayed a kind of "cyclical" attachment to antitrust policy, with a clamour for redressing imbalances in market power vis-a-vis suppliers and buyers. During periods of falling farm prices and rising costs, farmers become especially ardent advocates of antitrust policy, and ordinarily special inquiries are launched by Congressional Committees or the Federal Trade Commission.[1] In recent years the imbalance in market power between agriculture and other industries has been injected into the Administration's reappraisal of national agricultural policy in the light of the generally unsatisfactory situation in this sector of the economy. In the debate that has ensued over the failure of agriculture policy, we find, on the one hand, those who hold that imbalance in market power is essentially a false issue in connection with the problem of the stability and level of farm income.[2] On the other hand, there are those

[1] Cf. Especially A. C. Hoffman, *Large Scale Organization in the Food Industries*, Mono. No. 35, Temp. Natl. Econ. Comm. (Washington, 1940); Federal Trade Commn., *Report on the Meat Packing Industry* (1918), 33 Reports on Chain Store Inquiry (1931 and 1933), *Agricultural Income Inquiry* (1937), and the recent *Economic Inquiry into Food Marketing*. (Jan. 1960).

[2] Cf. K. E. Boulding, "Does Absence of Monopoly Power in Agriculture Influence the Stability of Level of Farm Income?" *Policy for Commercial Agriculture*, Joint

who argue that the possession and rational use of market power by food processing and agricultural supply industries generally have very serious implications for the cost-price squeeze on farmers' net income.[3]

Unfortunately, in all the discussion and debate over market power very little quantitative evidence and empirical data have been presented on the structural differences that prevail. The primary purpose of this paper is (a) to assemble such data, and (b) to analyze the nature and magnitude of market power among firms in the food processing and agricultural supply industries in terms of the statistical evidence on the structural characteristics of those industries. In addition, some attention will be devoted to the market conduct of firms in these industries, the economic effects of market power as manifested in profit margins and price behaviour, and some of the implications of these issues for agriculture in the future. It goes without saying, of course, that the market power issue is only one of many facets to the economic problems in agriculture. Also, I should make it clear that no effort will be made here to appraise the general efficacy of present and past farm programs as such.

Meaning of Market Power

Before proceeding further, it is necessary to indicate the meaning of market power as used in this paper. A given firm, or group of firms, can be said to possess market power when they individually or in concert are in a position to follow persistently price, product and marketing policies in a manner different from the conduct a competitively structured market would impose upon firms facing otherwise similar cost and demand conditions. I would like to stress that this concept of market power is defined basically in terms of *structural* considerations. Since we are interested in future performance of industry, as well as past and present performance, it is important to look at structural considerations. Even though we are unable to correlate performance and structural aspects with precision, both economic theory and empirical studies strongly support the view that structural characteristics of industries are the significant determinants of market conduct and performance.[4]

Econ. Comm. (Washington: Nov. 22, 1957), pp. 42-50, and D. Gale Johnson, "Government and Agriculture: Is Agriculture a Special Case?" *J. Law and Econ.*, Oct. 1958, pp. 122-36.

[3] See especially Robert L. Clodius, "Market Structure, Economic Power and Agricultural Policy: A Proposal for Forward Production Control," J. Farm Econ., 42:413-25, May 1960; Theodore J. Kreps, *An Evaluation of Antitrust Policy: Its Relations to Economic Growth, Full Employment, and Prices*, Study Paper No. 22, Joint Econ. Comm., U.S. Cong. (Jan. 30, 1960), pp. 37-41; and testimony of the major farm organizations in *Hearings on Current Antitrust Problems*, House Judic. Comm. (Washington, 1955).

[4] Students of industrial organizations are not in agreement on this point. See the papers and discussion of the topic, "The Significance of Industrial Organization and

The principal structural characteristics of markets that are relevant for the issue at hand include: (1) the degree of concentration of industry output (including the size-distribution of firms); (2) the conditions of entry to the industry (importance of economies of scale, capital requirements, and product differentiation, and other natural and artificial entry barriers); (3) the types and degree of integration (vertical, horizontal, and conglomerate) characteristic of producers; (4) the extent of product diversification in individual companies; (5) the nature of conventions developed by producers and sellers to minimize risks and uncertainty (e.g. price leadership, market sharing, and similar arrangements); and (6) conditions of industry supply (i.e. the extent to which supply to the industry is national or local and regional in scope, and geographically concentrated or unconcentrated). Not all of the foregoing characteristics lend themselves to quantitative measurement, but the following analysis will concentrate on those aspects which permit such quantification. Also, market power should not be evaluated solely in the context of the individual firm. Such an approach is, of course, appropriate for markets with obviously dominant firms, but in the more typical market structures characterized as oligopolies, market power rests on the interdependent nature of the group's behaviour, i.e. the power of one firm is a function of the actions of all.

Integration and Market Power

Because of the relationship between integration and market power and the increasing importance of integration in the food industries, some attention should be given to this structural feature. Integration is a broad concept in economics, covering the combination in a single corporation of activities carried on in several separate subsidiary companies, or through long-term contractual arrangements. Three general types of integration can be distinguished: vertical, horizontal, and conglomerate. *Vertical* integration refers to the combination in a single company of establishments which are related with respect to customers and supply. A firm may integrate forward to include distributive outlets in addition to end product fabrication facilities, or integrate backwards to include sources of raw materials supplies, processing of basic materials and related activities. A firm is said to be completely integrated vertically when the whole source of supply, fabrication and distribution is contained within the single enterprise. *Horizontal* integration represents the union of several companies engaged in the same stage of activity (e.g. a given level of fabrication) under a single company. *Conglomerate* integration represents a diversifi-

Market Structure to Development and Marketing Problems," *J. Farm Econ.*, May 1959, by J. W. Markham, W. W. Cochrane, W. F. Mueller, Walter Adams, N. R. Collins, and H. C. Trelogan, pp. 389-434.

cation of a company's activities which extends beyond the vertical and horizontal types. General Motors represents a good example, with far-flung activities ranging among automobiles, diesel locomotives, electric appliances, aircraft engines, Ethyl additive for gasoline, and other activities, some of which are not in a cognate field to other lines. In the food industries, various food processing and agricultural supply firms have reached rather high degrees of vertical, horizontal, and in certain cases, conglomerate integration (e.g., the Borden Company).

Vertical integration may represent real economies in handling, transfer, and fabrication of products (e.g. such technical economies as in the case of an integrated steel plant), and marketing and planning economies (e.g. a meat-packing operation with many branch houses). Vertical integration has developed in some situations, however, with no resulting real economies or social gains. In these cases, vertical integration may constitute a source and vehicle for market power. For example, integration backward to include raw material supplies in limited quantities, or forward to marketing outlets may afford large sources of market power to the company, or at least important buttresses to it, especially when suppliers or buyers are relatively small, numerous, and non-integrated. Furthermore, corporations in possession of important degrees of market power at one stage in the productive process are in a position to spread that power to lower or higher stages of manufacturing and distribution through vertical integration. The ability to accomplish this expansion of market power will be limited by the basic source of power in the company's "primary" market, as well as by conditions of entry into the market itself. In the latter connection, individual or group market power requires blockaded entry, i.e. by precluding entry through the acquisition of new or young firms, or mergers with them, or the pre-emption of markets by leading firms in anticipation of growth in market demand.

Situations have existed in certain U.S. markets whereby a given firm's market power in its basic industry or stage of industry is sufficiently large to afford a "price squeeze" on non-integrated or partially integrated competitors.[5] Also, entry can be controlled and competitors excluded by refusals to deal with the partially integrated or non-integrated firms. Furthermore, where the market power of the integrating firm in its basic market is superior to that of firms in supplying or buying markets, integration can lead to a market dominance in these additional markets. Even if market power in supplying markets or buying markets arises solely from company reputation, product differentiation, and brand attachment, it may afford occasions for gain to justify integration of the horizontal,

[5] This occurs whenever a supplier to a firm is also a competitor at a subsequent stage of production—e.g. Aluminum Company of America's "squeeze" on the non-integrated fabricators of aluminum sheets.

vertical or conglomerate types. Various forms of price and non-price discrimination are manifestations of market power buttressed by vertical integrations.[6]

Structural Characteristics of Food Processing and Agricultural Supply Industries

This section of the paper will provide a quantitative basis for demonstrating the market power of firms in food processing and agricultural supply industries by classifying industries according to certain objective structural characteristics. Essentially, we will identify those industries which are oligopolistic structurally, i.e. where a small number of sellers supplies a large part of industry output and where it is likely that interdependent behaviour among leading firms (as against independent behaviour) will be characteristic of the industry. Economic theory and experience, as disclosed by industry studies, indicate that oligopolistic markets will exhibit a monopolistic type of behaviour even though evidence of *overt* collusion among sellers may not be available in all cases.

Table 1 contains a compilation of four-digit census industry groups classified according to the structural characteristics listed above. The basic structure shown under the column headed "Type of Industry Structure" is based upon the findings of a recent study by Kaysen and Turner.[7] Markets are defined in terms of cross-elasticities of both demand and supply. The substitution process is properly defined in quantitative terms, but the authors found it necessary to separate the significant and insignificant substitution by various types of non-quantitative evidence.[8]

The three symbols listed opposite each four-digit industry group refer to the size of industry, extent of market, and market structure type, respectively, according to the following classification:[9]

The size of industry (by value of shipments):

I. Large, $1 billion or more.
II. Medium-large, $500 million to $1 billion.
III. Medium, $100 million to $500 million.
IV. Small, less than $100 million.

---

[6] According to a recent study on vertical integration in the broiler industry, the development of integration does not stem from "the drive for gains from increased technical efficiency but from the drive to reduce risks and uncertainty—a reduction to be achieved by exercise of market control. . . . Efforts to explain integration in terms of technical efficiency are likely to prove fruitless; any technical efficiency obtained results from effective control." S. K. Seaver, "An Appraisal of Vertical Integration in the Broiler Industry," *J. Farm Econ.*, Dec. 1957, pp. 1487ff.

[7] Carl Kaysen and Donald F. Turner, *Antitrust Policy: An Economic and Legal Analysis* (Harvard Univ. Press: Cambridge, 1959).

[8] *Ibid.*, pp. 295ff.

[9] *Ibid.*, p. 30.

TABLE 1. STRUCTURAL CHARACTERISTICS OF FOOD PROCESSING AND AGRICULTURAL SUPPLY INDUSTRIES

Census Code No.	Industry	Type of Industry Structure[a]	Concentration Ratios (First 8 Firms):[b] 1935	1947	1950	1954	Index of Disparity[c]
2011	Meat packing plants	I, 2, A	—	54	—	51	—
2015	Poultry dressing plants	I, 2, A	39	40	Over 18[d]	23	8.3
2021	Creamery butter	II, 3	—	24	—	24	6.3
2023	Concentrated milk	II, 2, A	—	63	—	68	8.8
2025	Special dairy products	III, 1, A	—	75	—	75	11.5
2026	Fluid milk	—	—	n.a.	—	28	—
2031	Canned seafoods	III, 1, A	—	41	—	57	—
2032	Cured fish	III, 1, A	—	49	—	62	—
2033	Canned fruits and vegetables	I, 2, B	—	35	Over 30	39	4.5
2034	Dehydrated fruits and vegetables	I, 2, B	—	71	—	69	12.2
2035	Pickles and sauces	I, 2, B	—	43	Over 35	48	2.2
2037	Frozen fruits and vegetables	I, 2, B	—	n.a.	—	55	7.1
2041	Flour and meal	I, 2, B	37	41	Over 34	52	5.9
2042	Prepared animal feeds	I, 2, B	34	27	Over 18	29	5.6
2043	Cereal breakfast foods	III, 1, A	82	91	Over 75	95	7.2
2044	Rice milling	I, 4, A	52	48	—	60	—
2045	Flour mixes	I, 2, B	—	60	—	82	—
2051	Bread and related products	I, 3	—	26	Over 18	31	4.9
2061	Raw cane sugar	I, 2, A	47	45	—	52	—
2062	Cane sugar refining	I, 2, A	88	88	—	86	—
2063	Beet sugar	I, 2, A	89	94	—	96	—
2071	Confectionary products	II, 2, B	19	25	Over 21	27	7.3
2091	Leavening compounds	I, 4, A	82	94	49[d]	93	—
2092	Shortening and cooking oil	I, 2, A	85	81	71	80	5.0
2093	Margarine	I, 2, B	96	90	Over 50	78	3.4
2094	Corn Wet milling	III, 1, A	95	95	Over 57[d]	93	7.6
2131	Chewing and smoking tobacco	I, 1, A	84	81	Over 69	82	4.1
2141	Tobacco stemming and redrying	I, 1, A	—	95	Over 69[d]	91	—
2851	Paints and varnishes	I, 2, A	—	36	Over 32	37	5.5
2871	Fertilizers	II, 1, A	—	56	Over 30	59	2.7
2872	Fertilizers, mixing only	II, 1, A	—	28	Over 26	29	2.8
2881	Cottonseed oil mills	I, 2, A	43	55	Over 29[d]	57	—
2882	Linseed oil mills	I, 2, A	97	97	81[d]	100	—
2883	Soybean oil mills	I, 2, A	—	63	Over 44	64	2.2
2884	Vegetable oil mills n.e.c.	I, 2, A	—	67	—	81	—
2897	Insecticides and fungicides	I, 4, B	—	n.a.	Over 44	54	4.0
2911	Petroleum refining	I, 3	58	59	58	56	2.1
2992	Lubricants, n.e.c.	I, 3	—	48	Over 53	42	3.7
3392	Wire drawing	I, 1, A	54	62	46	54	5.8
3423	Hand tools, n.e.c.	I, 1, B	36	33	Over 20	34	12.7

[a] For source and basis of classification and meanings of symbols see text.

[b] Per cent of value of industry shipments for leading 8 firms. Sources: *Concentration in American Industry*, Rept. of Subcomm. on Antitrust and Monopoly, Comm. on the Judiciary (Washington, 1957); *Report on Industrial Concentration and Product Diversification in the 1,000 Largest Manufacturing Companies, 1950*, FTC (Washington, Jan. 1957).

[c] For Explanation, see text, Cf. FTC, *op. cit.*, pp. 50–51.

[d] First 4 firms only—not available for first 8 firms.

TABLE 1.—Continued

Census Code No.	Industry	Type of Industry Structure[a]	Concentration Ratios (First 8 Firms):[b] 1935	1947	1950	1954	Index of Disparity[c]
3444	Sheet-metal work	I, 3	26	29	Over 21	28	3.0
3466	Galvanizing	—	56	46	—	37	15.3
3481	Nails and spikes	I, 4, B	64	n.a.	—	48	—
3489	Wirework, n.e.c.	I, 4, B	35	31	—	26	—
3491	Metal barrels, drums, and pails	III, 3	56	74	—	74	6.2
3521	Tractors	I, 1, A	—	88	87	88	5.6
3522	Farm machinery (except tractors)	I, 2, A	—	47	Over 55	51	5.7
3585	Refrigeration machinery	I, 1, A	—	55	—	51	—
3614	Motors and generators	I, 1, A	—	66	Over 56	59	9.0
3617	Electrical welding apparatus	I, 1, B	—	58	Over 52	52	8.2
3717	Motor vehicles and parts	I, 1, A	—	64	—	80	—

Extent of Market:

1. National—geographically concentrated supply.
2. National—geographically unconcentrated supply.
3. Local and regional.
4. Heterogeneous.

Market Structure:

A. *Concentrated* (Type 1 oligopolies, where the first eight firms make 50 per cent or more of total industry shipments and the first 20 make 75 per cent or more; Type 2 oligopolies, where the first eight firms make 33 per cent or more of the shipments and the first 20 firms make 75 per cent of the shipments).

B. *Unconcentrated.*

These data disclose that food processing and agriculture supply industries are characterized by a high degree of concentration generally—which provides the basis for market power and market control. It will be noticed that "concentrated" markets (as just defined) are the most typical structure of the 51 industries listed (29 cases). Also significant is the fact that 21 of the markets are national in scope with geographically *unconcentrated* supply, which permits large firms, individually or in groups, to use their power more effectively in separate markets. The most typical industry structure is essentially oligopolistic (either Type 1 or Type 2 oligopoly under Kaysen-Turner classification system), indicated in Table 1 as "I, 2, A".

The second part of Table 1 shows the concentration ratios for the largest eight firms in each industry for the years 1935, 1947, 1950,[10] and

[10] In 1950, for some industries only a minimum estimate of the percentage of out-

1954. It will be observed that the net change in concentration ratios between *1935 and 1954* included both increases and decreases. Out of the 24 industries for which data are available for 1935 as well as 1954, the concentration ratio increased in nine cases, decreased in seven cases, and remained virtually the same in eight cases (i.e. moved up or down by 5 per cent or less).

Between *1947 and 1954* concentration increased in 15 cases, decreased in 11 cases, and showed no change in 21 cases (i.e. increased or decreased by 5 per cent or less), out of a total of 47 industries for which data are available.

There have been several cases of very significant increases in concentration since 1947—flour and meal, flour mixes, vegetable oil mills, cured and canned fish and seafoods, rice milling, raw cane sugar, and motor vehicles, much of which was due to mergers and acquisitions. Some notable declines occurred also (in poultry dressing plants, margarine, wire drawing, galvanizing, and motors, generators, and electrical welding apparatus), but none of these declines approached the magnitude of the increases noted

The third part of Table 1 contains a measure of the disparity in market share among the eight leading firms (a kind of coefficient of variation which is termed a "disparity index"). Where the shares are approximately the same, the "disparity index" approaches zero, and where one or more firms have shipments which are much larger than the others, the index approaches a maximum of 17.5. (This index is based upon data for the year 1950, the latest available). It is difficult to generalize about the disparity of market shares, but there is sufficient evidence to indicate that the disparity in shares among the top eight firms is not extreme. This is an important consideration in connection with the tendency of firms to adopt mutually satisfactory price, production, and marketing policies. In effect, a market share psychology is more easily perpetuated under fairly equal shares among the leading firms.

Company Concentration in Industries and Product Classes

Food is processed by firms that make food their principal business, and with some important exceptions, these companies do little manufacturing not directly related to their food lines. Some, however, process a large variety of foodstuffs and some are also integrated backward into the manufacture of cans, cartons, and even food-processing machinery. The reinforcement of market power through vertical integration and product diversification, is indicated by a recent Federal Trade Commission study of the 1,000 largest manufacturing companies. The findings disclose that

put accounted for by the top eight firms is available. Hence, the figures are shown as "over . . .".

as of 1950 the 50 largest manufacturing companies made ¼; the 100 largest, ⅓; and the 1,000 largest, well over ½ of all shipments of manufacturing companies.[11] With respect to the food industries, these questions are significant: Are the top 100 companies important at all in food products? Are the leading food companies those which typically ranked below 100 or perhaps even below 500? Do the largest food companies typically confine their manufacturing activities to a few product lines? How much of the manufacturing activities of the largest food companies is in non-food lines?

In 1950, the latest year in which such data are available, approximately 97 per cent of the food products shipped by the 1,000 largest manufacturing companies were made by 127 firms principally engaged in food processing. Almost all of the remaining food products were shipped by companies principally engaged in chemicals and allied products, notably in the preparation of pharmaceuticals, soap making, and the extraction of vegetable oils. As for the 127 food companies, 94 per cent of the shipments consisted of food and one-half the remainder of chemicals and allied products—conspicuously, vegetable and animal oils, soap, and fertilizer. Less than 1 per cent was leather and leather products (an offshoot of meat packing), less than 1 per cent was packaging materials (barrels, wooden and paperboard boxes, paper cartons, and cans).

Since 1950, many of the larger companies have further diversified their lines, but new lines of importance generally are foodstuffs. The FTC found that companies with the largest shipments of all products tend to make a smaller proportion of the shipments in their principal industry. This was found to be the case in four out of seven food industries.[12] This degree of diversification helps disguise the full market power potential that can be brought to bear in any of the company's line, should this be necessary or desirable.

Apart from a few exceptional and relatively minor situations (e.g. chocolate and chewing gum) the output of the four leading companies in the food industries far exceeds that of the four leading plants.[13] Thus, whatever economic concentration exists on a national scale in processed foods is not due to economies of mass production so far-reaching as to permit the operation of only a few very large plants. Technical considerations, on the contrary, have impelled the erection of numerous plants for the manufacture of almost every type of foodstuff oriented toward either a regional market or a proximate supply of raw materials.

The FTC study also discloses some very interesting data about the degree of product diversity and power of individual companies, shown in

[11] FTC, *Report on Industrial Concentration and Product Diversification in the 1,000 Largest Manufacturing Companies, 1950* (Jan. 1957), pp. 22-43.
[12] *Industrial Concentration and Product Diversification . . ., op. cit.*, p. 48.
[13] *Ibid.*, p. 48ff.

Table 2. The table is organized as follows: Opposite each company is given the number of product classes in which the company was one of the *top four* producers out of the *total* number of product classes in the industry group (shown at the top of the column). The degree of product diversification and tendency toward conglomerate types of activities is especially noticeable in the cases of Swift, National Dairy Products, General Foods, General Mills, Standard Brands, and Borden, among others. The significance of these statistics is the reflection of potential market power which conglomerate types of activities may afford the given company. Moreover, to the extent that a few companies meet one another in several sub-industry groups of different industries, they have a community of interest in dealing with one another, as well as against buyers, suppliers, and outsiders. This particular aspect, which might be referred to as implicitly or inherently collusive behaviour (not necessarily illegal), is easily overlooked in assessing the power potential of leading firms. In the years ahead, the market power arising out of highly diversified conglomerate companies may well present the most difficult kinds of problems for the policy of maintaining competition. The post World War II trend in merger activity, particularly in the industries in question, underscores the urgency of this problem.

Trend of Mergers and Acquisitions in the Food Industries

The food and kindred products industries, and certain already leading firms in particular, have been very prominent in mergers and acquisitions. Over the 1948-54 merger cycle this industry group was the second most active both in terms of the number of *acquiring* concerns and the number of concerns *acquired*.[14] Moreover, since 1955 the food and kindred products groups has ranked third to fifth in merger activity, with 87 mergers and acquisitions in 1955, 59 in 1956, 32 in 1957, 36 in 1958 and 55 in 1959.[15] Significant here are not only (a) the large number of independent firms being acquired year after year, but also (b) the prominence of the food and kindred product industries in mergers nationally and (c) the renewed merger activity since 1957 in the food industries.

The most active firms in terms of acquisitions among all U.S. corporations during the 1948-54 period were Foremost Dairies, which made 48 acquisitions, and Borden, with 17 acquisitions.[16] Borden is still active in

[14] Over the period in question, 100 food product firms acquired 243 other firms. FTC, *Report on Corporate Mergers and Acquisitions* (Washington, May 1955), pp. 25-31.

[15] Bureau of Economics, FTC. The 1958 and 1959 data are limited to actions reported by Moody's Investor Service and Standard and Poor's, which in recent years have included about 85 per cent of all merger actions.

[16] Other active firms were Olin-Mathieson Chemical (16 acquisitions) and Food Machinery and Chemical (14 acquisitions).

TABLE 2. COMPANY CONCENTRATION IN FOOD INDUSTRIES AND PRODUCT CLASSES AS OF 1950
(Figures opposite each Company indicate number of product classes in which the company is one of the four leading companies)

Company	Canned, Preserved, and Frozen Foods (19)*	Flour, Feed, and Bakery Products (13)*	Meat and Meat Products (5)*	Dairy Products (14)*	Sugar and Confectionary Products (9)*	Other Foods—Eggs, Shortening, Baking Powder, & Related Products (19)*	Fertilizers (4)*	Beverages (except milk, fruit, and vegetable juice) (12)*
California Packing Corp.	5	—	—	—	—	—	—	—
Campbell Soup	5	—	—	—	—	—	—	—
Libby, McNeil, Libby	4	—	—	—	—	—	—	—
Stokeley-Van Camp	5	—	—	—	—	1	—	—
Armour	—	—	5	3	—	—	3	—
Swift	2	1	4	5	—	3	3	—
Wilson	—	—	4	1	—	—	1	—
National Dairy Products	3	—	—	11	—	4	—	—
Borden	—	—	—	13	1	2	—	—
Carnation	—	1	—	7	—	—	—	—
Hunt	5	—	—	—	—	2	—	—
Heinz	9	—	—	—	—	1	—	—
General Mills	2	7	—	—	—	—	—	—
General Foods	3	3	—	—	3	3	—	3
Pillsbury	—	3	—	—	—	1	—	—
Russell-Miller	—	3	—	—	—	—	—	—
Quaker Oats	—	6	—	—	—	1	—	—
Standard Brands	—	1	—	—	—	9	—	3
Pabst	—	1	—	—	—	1	—	7
Annheuser-Busch	—	—	—	—	—	3	—	3
National Distillers	—	—	—	—	—	—	—	5
Schenley	—	—	—	—	—	—	—	5
Walker	—	—	—	—	—	—	—	4
Seagram	—	—	—	—	—	—	—	4

Source: Compiled by author from FTC *Report on Industrial Concentration and Product Diversification in the 1,000 Largest Manufacturing Companies: 1950* (Jan. 1957), Appen. C, Tab. 1, pp. 152–254.
* *Total* number of product classes in the industry listed.

acquisitions (horizontal, vertical, and conglomerate): in 1956 it acquired a manufacturer of vinyl shoe welting, sheeting, and tubing; in 1958, a creamery and a cosmetics firm; and in 1959 a dairy products processor, a clam processor, a fluid milk processor and a preserved fruit processor. Significantly, during the 1957-59 period, half of the large diversified food companies listed in Table 2 have acquired up to four more firms each.

Important trends in concentration and integration in food distribution also have been proceeding apace with the above developments. According to a recently published FTC report,[17] 86 of the 165 corporate U.S. food chains with 11 or more units at the end of 1958 had made some acquisitions since 1948. Of these, 83 acquired food stores; the three others (as well as many of the 83) acquired manufacturing establishments or wholesalers or warehouses. The pace of food store acquisitions was stepped up sharply in 1955. From 1955 through 1958, 1,678 stores with $1,604 million in sales were acquired, as against 560 stores with $316 million in sales from 1949 through 1954. A few large firms accounted for most of these acquisitions; of the eight leading chains, the seven that made acquisitions accounted for 51 per cent of the food stores acquired over the 1949-54 period.[18]

In 1949-58, 35 chains also strengthened their vertical and horizontal integration by acquiring 51 manufacturers, 29 wholesalers, and 46 warehousing companies, many of which owned several plants or more. Significantly, the nine chains most active in acquiring retail stores accounted for 42 of the 58 manufacturing establishments purchased.[19] Other statistics of interest show that 17 chains are subsidiaries of other large corporations (e.g. two are subsidiaries of Consolidated Foods); that several leading chains have joint interests in small processors, in a large wholesale procurement agency, and in a milk products processor; and that in four instances interlocking directorates exist between pairs of food chains, as well as many interlocks between officers and directors of the 30 largest food chains.[20] In the light of past experience these events warrant close scrutiny, especially of the purchasing patterns (i.e., buying practices and supplier relationships) of large food processors and chain food distributors.

The foregoing statistics on the structural characteristics and growth path of the food processing and agricultural supply industries are fairly

Source: Compiled by author from FTC *Report on Industrial Concentration and Product Diversification in the 1,000 Largest Manufacturing Companies: 1950* (Jan. 1957), Appen. C, Tab. 1, pp. 152–254.
* *Total* number of product classes in the industry listed.

[17] *Economic Inquiry Into Food Marketing*, Part I, "Concentration and Integration in Retailing" (Washington, 1960), pp. 126-56.

[18] National Tea acquired 22 per cent of the stores with 13 per cent of sales; acquisitions of Winn-Dixie bring the totals up to 35 per cent and 25 per cent respectively; of Kroger to 40 per cent and 34 per cent; of Grand Union, Colonial Stores and Food Fair to 54 per cent and 52 per cent; and of Lucky Stores, Jewel Tea, American Stores and Safeway to 66 per cent and 63 per cent, *ibid.*, pp. 138-42.

[19] *Ibid.*, pp. 147-49.

[20] *Ibid.*, pp. 150-56.

strong circumstantial evidence of high and growing market power in the economic sense. In both groups of industries we find relatively high and undiminished concentration of economic control; vertical, horizontal, and conglomerate integration; with considerable diversification in product fields, persistent mergers and acquisitions, barriers to entry, and obvious community of interests arising out of the oligopolistic structures themselves; plus various joint interests and intercorporate interlocks.

It is, of course, difficult and dangerous to generalize about the conduct and performance of oligopolistic industries on the basis of these structural features, since both conduct and performance may vary considerably among industries with similar structures. However, economic theory and experience indicate that marketing strategies and policies to nullify or avert competition, and to develop conventions to insure same, are highly correlated with these types of market structures. In agricultural supply industries (e.g. automobiles and trucks, farm machinery, chemicals, oils, steel, construction materials, etc.) firms are in a position to control important market variables sufficiently to permit management to administer prices and profits. Typical manifestations are stabilized prices, market sharing, and profit protection, designed to attain predetermined price-income objectives.[21] The harmful effects on competition and injury to farmers of this type of market conduct are witnessed by the scores of litigated antitrust cases and Federal Trade Commission orders against large firms producing steel, fertilizers, farm machinery, oil, specialized feeds, veterinary supplies, construction materials, electric motors, paints and other supplies.[22]

Similar market structures are found in the agricultural food processing and food marketing industries, in which firms exert their market power in various ways. Farmers, as sellers, have found themselves at the mercy of oligopsonies, collusion, and monopsony. Indicative are the numerous antitrust actions against corporate grocery chains, national baking companies, meat packers, flour millers, large canneries, dairy product firms, and handlers and processors of such farm crops as livestock, tobacco, potatoes, grain, cottonseed oil, fruit, truck crops.[23]

Profit Margins and Market Power

The foregoing data on market structure and the conduct of firms in both groups of industries reveal that leading firms possess considerable market power and are inclined to utilize such power to manage or admin-

[21] See R. F. Lanzillotti, "Pricing Objectives in Large Corporations." *Amer. Econ. Rev.*, Dec. 1958, pp. 921-40, and "Comments" by A. E. Kahn and M. Adelman and "Reply," *ibid.*, Dec. 1959, pp. 669-87.

[22] See *Hearings on Current Antitrust Problems, op. cit.*, pp. 158-61, 647-70, 1934-35, and 1733-34; and Kreps, *op. cit.*, pp. 39-41.

[23] *Ibid.*

ister their market situation. In industries selling supplies to agriculture, administered prices and profits result.[24] Firms in industries buying, processing, and distributing farm products also are in a position to protect their profit margins and to force back onto producers the effects of unfavorable developments or conditions in their own markets.[25] The exercise of market power along the lines mentioned is reflected in the profit pattern of leading firms.

It is difficult to demonstrate conclusively a relationship between profit rates and degree of concentration or market power in industry, but there is some evidence to suggest that profit rates of firms in industries with high seller concentration on the average tend to be larger than those of firms in industries of lower concentration.[26] Equally significant for the superior market power thesis is the *durability* of profit rates over time. Table 3 shows the net income, expressed as a percentage margin on sales, for the leading corporations as a group and the "top four," "top five," etc., firms in the food processing and distribution and agricultural supply industries.[27] A number of interesting relationships and trends in profit margins are shown in the table, about which a good deal could be said. There is considerable variation in the profit margins among the industries included, reflecting, among other things, high as against low sales turnover. The important aspects for the thesis of this paper is the rather high degree of year-to-year stability in profit margins of the leading firms, represented by both the National City Bank sample and the top few firms separately, in most of the industries covered, especially baking, dairy products, tobacco, petroleum, and chain food stores.[28]

Although the average profit margins generally did not return to pre-

---

[24] The disparities that have developed in the price universe since the 1920's, with two fairly distinct sections—one of flexible prices and the other of "administered" prices—have been documented by Gardiner C. Means in *Industrial Prices and Their Relative Inflexibility* (Washington, 1959) and by Frederick C. Mills in "Economic Tendencies in the United States," *Aspects of Prewar and Postwar changes* (N.B.E.R., 1952).

[25] Cf. Clodius, *op. cit.*

[26] Joe S. Bain found a rough dichotomy between those with concentration ratios for the top eight firms of 70 per cent or higher and those below 70 per cent. "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940," *Quar. J. Econ.*, Aug. 1951, pp. 293-324.

[27] The percentage margin on sales seems the most meaningful measure for showing the ability of firms to maintain their profit margins. Such a measure avoids the problem of adjusting data for price-level changes, which arises in the case of ratios of profits to assets.

[28] It should be noted that the N.C.B. sample also includes the few largest firms, shown separately, which in many cases are sufficiently important in relation to total industry sales to heavily weight the averages for the larger group. In several cases the few largest companies have lower margins than the average for the N.C.B. sample, but because of the weighting factor care should be exercised in making such comparisons.

TABLE 3. NET INCOME AS PERCENTAGE MARGIN ON SALES OF LEADING FIRMS IN FOOD PROCESSING AND AGRICULTURAL SUPPLY INDUSTRIES, 1949–1959

Industry	No. of firms*	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	Average, 1949–59
Baking	18–24 Leading Firms	5.2	5.0	3.5	3.6	3.5	3.3	3.4	3.3	3.4	3.2	3.4	3.7
	Top 5 firms	3.7	3.6	2.7	2.9	2.8	2.6	2.9	2.7	2.6	2.5	**	2.8
Dairy Products	11–16 Leading Firms	3.2	3.0	2.2	2.1	2.2	2.5	2.6	2.6	2.5	2.6	2.6	2.6
	Top 6 firms	3.4	3.3	2.4	2.3	2.4	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Meat Packing	13–19 Leading Firms	0.5	0.8	0.6	0.4	0.7	0.4	0.8	0.9	0.5	0.5	1.0	0.6
	Top 4 firms	0.5	0.8	0.6	0.4	0.8	0.3	0.7	0.7	0.5	0.5	0.8	0.6
Sugar	18–25 Leading Firms	4.4	5.5	6.2	4.4	2.3	2.9	3.2	3.7	4.9	3.5	3.0	4.0
	Top 4 firms	3.2	3.3	2.9	2.6	2.3	2.7	2.7	2.8	2.8	3.1	2.8	2.8
Other Food Products	78–88 Leading Firms	4.8	5.1	3.6	3.1	3.3	3.7	4.0	4.2	3.9	4.2	4.1	4.0
	Top 4 canning firms	5.5	5.7	5.8	3.9	4.1	4.1	4.7	4.7	4.2	3.5	4.4	4.5
	Top 4 dry product firms	4.3	3.8	3.3	2.5	2.8	3.1	3.2	3.4	3.4	3.8	3.9	3.4
Brewing	20–27 Leading Firms	8.2	6.6	4.7	4.2	3.8	3.6	3.1	3.3	2.5	3.0	3.4	4.2
	Top 3 firms	10.7	8.2	5.8	5.4	4.9	4.2	3.6	3.1	2.5	2.5	3.3	4.7
Distilling	10–13 Leading Firms	5.5	6.6	5.0	3.6	3.3	3.1	3.5	3.0	3.6	3.6	3.8	4.0
	Top 3 firms	5.1	6.4	4.7	3.3	2.9	2.7	2.8	2.5	2.8	3.1	**	3.6
Tobacco	16–23 Leading Firms	5.5	5.2	3.9	3.4	3.9	4.4	5.0	5.1	5.2	5.7	5.8	4.8
	Top 5 firms	5.3	5.1	3.9	3.4	3.7	4.4	5.0	5.0	5.2	5.7	5.8	4.8
Chemical Products	61–72 Leading Firms	10.3	11.7	9.9	7.7	7.6	8.9	10.0	9.1	8.5	7.2	8.9	9.1
	Top 5 firms	16.8	18.6	12.2	11.4	11.0	13.7	14.9	13.5	12.8	11.1	**	13.3
Petroleum Products and Refining	45–131 Leading Firms	9.9	11.2	11.5	10.5	10.6	10.7	10.6	10.4	9.7	8.4	8.4	10.2
	Top 5 firms	9.6	11.2	11.9	11.1	11.6	10.6	11.6	11.1	10.5	8.5	8.0	10.3
Agricultural Implement	10–12 Leading Firms	7.6	8.3	5.4	5.3	4.2	4.4	5.2	4.8	4.1	4.6	5.8	5.4
	Top 5 firms	7.8	8.6	5.5	5.4	4.5	7.3	5.4	5.0	4.7	4.9	**	5.7
Hardware & Tools	44–51 Leading Firms	5.8	8.2	6.1	5.1	4.5	4.8	5.7	6.3	5.9	4.0	4.7	5.6
	Top 3 firms	9.1	8.7	6.1	6.5	5.9	6.4	7.4	6.2	6.5	4.0	6.1	5.7
Autos & Trucks	13–25 Leading Firms	8.9	8.9	5.2	5.5	4.4	6.4	7.4	5.7	5.7	4.2	6.7	6.3
	Top 3 firms	10.0	9.6	5.5	5.9	4.8	9.4	8.0	6.1	6.1	4.4	**	5.9
Chain Food Stores	23–42 Leading Firms	1.6	1.7	1.1	1.0	1.1	1.2	1.2	1.4	1.4	1.4	1.4	1.3
	Top 9 firms	1.4	1.3	0.9	0.9	1.0	1.0	1.0	1.2	1.3	1.3	1.3	1.1

SOURCES: "Leading Firms," First National City Bank Monthly Letter, Business and Economic Conditions, April issues, 1950–1960; "Top firms," Computed from Moody's *Industrials* and FTC *Economic Inquiry Into Food Marketing*, p. 84.

* Number of companies included in National City Bank sample has varied slightly from year to year. Range for entire period is shown.

** Some firms included in category not availbale.

Korean levels after the expiration of the higher corporate tax rates of the 1950-53 period, it is significant that the average for the top few firms bounced back much better than those for the larger groups of companies. This is not the kind of stability in profit ratios that is to be expected, since the long-term trend in sales/investment ratios has been rising generally in manufacturing.[29] To the extent that this trend holds good for the industries in question, one would expect sales margins (after taxes) to fall if a constant rate of return is to result. Hence, the more stable ratios of income to sales of the "top 3," "top 5," etc. could be another indication of superior market power.

The principal reason for singling out the margins of the few largest firms is to determine whether even more stability of margins exists among this group.[30] Durable profit margins characterize especially the top five bakeries, the top six dairy product firms, the top five sugar refiners, the top five chemical producers, the top five agricultural implement makers, the top three hardware and tools manufacturers, and the top nine chain food companies.

These data by themselves, of course, are not conclusive evidence of monopolistically determined prices and profits, but at the same time this is not the kind of profit-margin stability that is to be expected under competitively-determined prices. Considered in conjunction with the structural data presented above, these data do reflect an ability to "order" margins and profits, and thus are an additional indicator of the presence of superior market power.

Impact of Market Power Imbalance on the Farm Problem

The above data and analysis indicate the kind of structure, market power, behaviour, and market results to be expected from food processing and agricultural supply industries. By contrast, the structural features of agriculture, i.e. the size-distribution of farms, product homogeneity, level of managerial skill, exit barriers, demand-supply elasticities, etc., are conducive to an inferior bargaining position for farmers vis-a-vis both buyers and suppliers. This structural inferiority means that under short-run price fluctuations during the crop year the farmer is not in a position to engage in the well-ordered marketing (i.e. to hold or adjust large inven-

[29] Eugene M. Lerner and Eldon S. Hendriksen, "Federal Taxes on Corporate Income and the Rate of Return on Investment in Manufacturing, 1927 to 1952," *Natl. Tax J.*, 8:199ff. (Sept. 1955). A recent study by Musgrave *et al.* finds that for 1936-39 and 1954-55 "increase in the rate of return for all corporations was due entirely to the rise in turnover. Indeed the rise was so sharp as to greatly overcompensate the decline in margin." P. Briant, M. Krzyzaniak, and R. A. Musgrave, "An Econometric Approach to the Incidence of the Corporate Income Tax" (prelim. rept., mimeo.), p. 7.

[30] The largest three, four, five, or other number of firms that includes the "oligopoly core" of the industry were broken out separately.

* Number of companies included in National City Bank sample has varied slightly from year to year. Range for entire period is shown.
** Some firms included in category not available.

tories) typical of large manufacturers and processors. Also, much as farmers would like to, they are unable to escalate cost increases forward in the administrative fashion of manufacturing industries.[31] A price universe with such a cleavage inevitably produces inequities, with the flexible price sector suffering the brunt of the price disparity. These inequities might very well arise in any event in the normal processes of economic development in an advanced industrial economy. But be that as it may, the fact remains that the structural superiority and market power of food processors and agriculture supply firms constitute an aggravating influence to adjustments in prices and incomes in agriculture.

There is abundant evidence showing that agricultural income behaves very differently from that of manufacturers and processors over the course of business fluctuations—even over the relatively mild recessions characteristic of the post World War II period. It is well established that the decline of agricultural income results essentially from a sharp decline in prices of agricultural products, whereas variations in incomes of manufacturers and processors is brought about largely through adjustments in production and employment, with prices held fairly constant, or even increasing. Furthermore, as pointed out above, profits of large manufacturing firms are likely to be more durable than farm profits.[32] In my view, there is little doubt that the fundamental reason for these differences lies in the different market structures and market power of producers. Over short-run periods, therefore, we can expect this imbalance in market power to aggravate farmers' worsening "terms of trade" vis-a-vis suppliers and processors, which in turn results in lower real farm income.

This kind of income disparity, which becomes most pronounced with downward business fluctuations, is likely to persist as a long-run phenomenon—unless appropriate adjustments take place in agriculture. As a long-run matter monopolistic exploitation from agricultural suppliers and monopolistic exploitation from buyers of farmer products can thrive only if certain conditions exist—namely, non-competitive ("collusive") behaviour among suppliers and among processors coupled with immobility of agricultural resources. Unfortunately, for the most part both conditions are met. The high rate of improvement in agricultural productivity has resulted in redundant capacity with a chronic tendency toward overproduction. (Capacity is redundant and production excessive, of course,

---

[31] This is true, of course, only when demand is less than supply at a satisfactory price. Prices "escalate" very quickly when market demand is high, as in 1945-47, but this is a market phenomenon, not corporate price administration.

[32] Cf. R. F. Lanzillotti, *Employment, Growth and Price Levels*, Hearings before the Joint Economic Comm., 86th Cong., 1st Sess., Pt. 7, "The Effects of Monopolistic and Quasi-Monopolistic Practices," pp. 2237-62.

only at some given price or set of prices). Under certain assumptions, the price system will provide the answer to this paradox—i.e., through declining prices (since production never declines quite fast enough) and lower farm incomes. Under this process, income differentials are a function of the degree of mobility of resources; thus a significant income disadvantage should produce the desired mobility. However, mobility or immobility of resources should not be considered only in terms of *exit* from agriculture (as affected by farming as a way of life, liquidation of capital investment in land and equipment, and related factors). The real question concerns mobility of resources *between* agriculture *and* industry (i.e. *ease of entry* into industry as well as exit from agriculture) and the distribution of monopolistic and competitive markets, size-distribution of firms and other structural factors affecting the mobility of resources. The mobility frictions and barriers are large and important both with respect to farm exit and industry entry.

It needs to be mentioned in this connection that currently the most significant mobility friction is the price-support system. In the light of this factor it is probable that the "farmer surplus" consists primarily of farmers who would be sub-marginal with lower prices. For these producers the problems of exit should not be too serious *from an economic standpoint*—at least nothing of the magnitude of the problem facing, say, capitalistic wheat farmers, whose costs are probably low enough in any event to survive much lower prices.

Conclusions

This brings us to the question of agricultural policy, which, while lying outside the primary purpose of this paper, must be given at least brief attention. It was indicated at the outset that there are varied causes and facets to the price-income problem in agriculture, of which the differential market power issue is only one. Some aspects of the farm difficulties clearly are not uniquely a "farm problem"—e.g., uneconomic scale of operations, poor management, poverty, etc.—but rather are general problems in our economy, affecting all lines of industry and commerce, and should be dealt with as general problems.

It is equally clear that the price system has not performed the function of adjusting the amount of investment and other productive factors to the need for them in alternative opportunities; consequently, the desired exit of farm operators and farm labor has been slow and insufficient. Unfortunately, national agricultural policy has done little to assist the price system in this task; indeed, our policy has been a complicating and retarding influence. The approach which takes the plight of the poor farmer on poor land as the typical case and the basis upon which to formulate agricultural policy is erroneous and wasteful. The competent

and efficient commercial farms on high quality land are capable of producing enough to provide a reasonable return on investment, especially if competitive market structures are maintained. And, please note, it is this particular group of producers who are associated fundamentally with surpluses and who represent the pure economic problem in agriculture.

Viewed in this context, the aggravating influence of market power imbalances on price-income relationships, as well as on short- and long-run market adjustments, makes the central question one of appropriate measures to deal with concentrated market structures and uncontrolled market power. Two different approaches to offset weaknesses in market power of farmers are: (a) to build countervailing power through direct or indirect government action or special additional antitrust immunities for agriculture, and (b) to dissolve or lessen the market power of groups to whom the farmer sells or from whom he buys.

Proposals for further cartelizing agriculture as a solution to the problem are the counsel of despair. In particular, attempts to develop an economic policy in this area along lines of countervailing power leave much to be desired. In the first place, there is a real question whether the market power already granted to farmers through various laws has produced, or is capable of producing, an arrangement approaching a viable and equitable sort of democratic process in which the price system plays a crucial role. In the second place, the thesis really does not offer a solution. It does not work largely because it attempts to replace the "invisible hand" of Adam Smith with the 'invisible fist" of government. This is not to say that more efficient producing and buying units are not desirable from a social point of view. More integration and larger scale production, such as is occurring in dairying and poultry, are bound to change bargaining relations to some extent and should be encouraged. But greater insulation of cooperatives' activities from antitrust statutes, for example, serve no general social ends and are not economically justified. In this connection, the recent Supreme Court ruling against the Maryland and Virginia Milk Producers Association is fully consistent with traditional antitrust policy in holding that the co-op's acquisition of Embassy Dairy went beyond its antitrust immunity to the point of restraining and suppressing competitors and competition.[33]

More vigorous antitrust policy, while slow, offers the basic and most effective approach to redressing market power. A dynamic economy is continually making some kind of capacity redundant and making adjustment necessary. But where imbalances in market power aggravate adjustment problems by worsening income distribution, the blame should be assessed and policy action focused upon the monopoly elements, not

[33] See *Wall Street Journal*, May 3, 1960.

on competition. It is vastly preferable and more effective to attack the existing monopolistic elements than to encourage additional monopoly elements in the other sectors. In particular, there seems to be ample evidence for suspicion of the growth patterns and market conduct of food chains. This development serves to emphasize the importance of effective enforcement of the 1950 anti-merger amendment to the Clayton Act, especially in food processing and distribution as well as agricultural supply industries. These particular industries stand out in the merger activity of leading firms, and warrant close scrutiny regarding their impact on industry concentration and reinforcement of market power. Successful enforcement of the anti-merger statute offers the best prospects currently for lasting structural changes in American industry generally and for more effective and more equitable market processes in the food processing and agricultural supply industries in particular.

DISCUSSION: THE SUPERIOR MARKET POWER OF FOOD PROCESSING AND AGRICULTURAL SUPPLY FIRMS—ITS RELATIONSHIP TO THE FARM PROBLEM

S. KENT CHRISTENSEN
National Association of Food Chains

In the preceding paper, Professor Lanzillotti attempts to indicate quantitatively the difference in market power between agriculture and its suppliers and buyers. He concludes that the agricultural supply firms and food processors and distributors do have vastly greater market power than farmers and that they are using this market power to the detriment of agriculture. In other words, the low prices and income situation in agriculture is aggravated by the difference in market power.

The solution to his concluded reason for the adverse farm situation is—"More vigorous anti-trust policy . . ." It is vastly preferable," he says, ". . . to attack the existing monopolistic elements than to encourage additional monopoly elements in other sectors"—i.e., in agriculture. In this connection he questions whether any of the existing legislation and programs open to farmers have produced or will produce the results necessary to improve the agricultural price situation.

He defines market power as that market characteristic existing when a firm or group of firms are in a position to follow persistently price and marketing policies in a manner different from the conduct of a competitively structured market. This concept of market power, as Lanzillotti points out, is basically defined in terms of structural considerations. Six principal structural characteristics are mentioned as being significant

determinants of market conduct and performance, which in turn reflect market power.

His evidence would indicate a considerable degree of concentration in the agricultural supply and food processing industries; also that there are important amounts of product diversification among the top four firms, at least in selected industries—but by no means for all industries.

The ease of entry to an industry, including capital requirements and product differentiation, were neglected seriously in discussing the structure of the food processing industry and also in discussing its performance. This is a particularly important omission in light of the dramatic influence of the chain store entry or potential entry into food processing industries if conditions warrant, i.e. high profits, inefficiencies, or both.

As Mueller and Garoian so ably have pointed out, the relative ease with which the chains can develop their own brands places them in the unique position of being able to integrate into a wide assortment of grocery manufacturing industries.[1] They can do so either by manufacturing their own products or by buying on a specification basis for sale under their own label. The chains do not need to enter the field of processing in all instances. Often the potential to do so is enough.

Performance

In several places in his paper, Lanzillotti makes the statement that empirical studies and economic theory strongly support the view that structural characteristics are the significant determinants of market conduct and performance. He goes on to say that oligopolistically structured industries will exhibit monopolistic behavior and ". . . that marketing strategies and policies to nullify or avert competition . . . are highly correlated with these (oligopolistic) types of market structures."

He offers, however, only one questionable line of evidence to substantiate this conclusion on performance, i.e. that profits are larger than in industries functioning under competitive conditions or under low concentration conditions, and secondly, that profit rates are durable over time. His figures do not substantiate this conclusion. In the first place, the profit rates are relatively low. In the second place, they have not been durable—they have been variable and generally declining. Furthermore, the averaging of profits for several firms obscures the variation in profit for the individual firm. The recently released report of the Federal Trade Commission[2] shows considerable variation percentagewise from year to year for individual food supply and chain store firms.

---

[1] Mueller, W. F. and Garoian, Leon, *Changes In the Market Structure of Grocery Retailing, 1940-1958*, Wis. Ag. Expt. Sta. Res. Rept. 5, 1960, p. 60.

[2] FTC Staff Report, *Economic Inquiry Into Food Marketing, Part I, Concentration and Integration in Retailing*, Jan. 1960, p. 95.

If Lanzillotti's standard for measuring market power—i.e. the level of profits—is accepted, it would indicate that the chains have far less relative market power than any industry except meat packing.

As indicated above, Lanzillotti failed to recognize the effect of chain store action upon market performance of the food processing industries. On this subject, Mueller and Garoian conclude, and I agree completely, that the chains have been able through direct or indirect competition to force the food processing industries to perform more nearly in conformance with the competitive market structure. Thus products and services have been improved and profits reduced in the food processing industries. At the same time, profit margins of chains have not been increased during this period.

Mueller and Garoian also conclude that while chains have forced an increase in competition among food processors, they do not have any real monopoly power in the usual sense of the word. There are still so many food retailers (about 800 chains with more than 4 stores each, 800 cooperative and voluntary chains, and about 190,000 unaffiliated independents) that in buying, no one—or even a few—can push prices below competitive levels for long, except in very localized markets.

Although quantification would be difficult, I would have expected Lanzillotti to indicate some of the improvements in market performance as evidenced by increased services; improved quality; added variety; improved packaging, storage and sanitation; increased availability, both geographically and on a seasonal basis; new products; increased efficiencies resulting from economies of scale, adoption of new technology, and improved management. All these add up to improved services and satisfaction to consumers—the acid test of performance. So far as food chains are concerned, the performance record is very clear.

That food store sales have become concentrated in fewer stores and firms cannot be denied. Corporate chains (11 or more stores) increased their share of total food store sales from about 35 percent to 43 percent from 1948 to 1958. In addition, 70,000 retailers have become members of corporate groups operating their own wholesale establishments or of voluntary groups sponsored by wholesalers.

Contrary to popular conceptions, however, the largest relative growth in food sales has not been among the traditional giants. Sales by A&P, the largest food chain, have remained at about 10 percent of the total food store sales since 1929. The next three largest chains increased their share of the market by only 1 percent—from 8 to 9 percent. On the other hand, sales by the smaller chains increased from 11 to 19 percent of the total food store sales. Also contrary to popular belief, the cooperative and voluntary chains grew faster than the large corporate chains. Retail volume of cooperative groups is estimated to have increased from about

8.5 percent to 15 percent of total food store sales and sales from voluntary groups increased from 14 to 18 percent in the period 1948 to 1958.

Another misconception is that the 225,000 stores which have gone out of existence since 1939 were all independents. The truth is that well over half of the stores that were closed belonged to chains.

What can be concluded from these figures? Again I would refer you to the intensive study by Mueller and Garoian on *Changes in the Market Structure of Grocery Retailing*. They arrived at the following conclusions relative to market power on the buying side of the market:

> Despite the increased concentration . . . grocery retailing in 1958 *was much less concentrated* than most other American industries. . . . The structure of the buying side of grocery retailing appears to be characterized by a fairly large number of large and medium-sized chains or affiliations of independents and a very large number of smaller firms. Economic theory suggests that such market structures severely limit interdependent pricing behavior; that is, this large number of firms would encourage . . . many buyers to behave as if their individual market behavior had an insignificant effect on market conditions . . . any price leadership practiced in buying products sold in national and large regional markets is essentially the competitive barometic type.[3]

The authors attribute at least part of the satisfactory performance among retailers to the fact that the larger chains increasingly are competing with one another in the same markets. This conclusion is supported by statistical evidence.

Impact of "Market Power" on the Farm Situation

Lanzillotti concludes that "the superior market power" of food processors is an important factor in causing low prices and low income in agriculture. His paper contains no evidence to support such a conclusion. He does suggest that ". . . injury to farmers and harmful effects on competition are witnessed by the scores of litigated anti-trust cases and the Federal Trade Commission Orders . . ." against supply firms and "numerous anti-trust actions against . . . food processors and distributors." I submit that these actions are practically all related to harm against competitors and are not indications of injury to farmers.

Lanzillotti is correct in his major premise—that there exists a fundamental difference in the structure for agriculture as compared to nonagriculture. However, in my opinion, he attributes far too much of the farm income disparity to structural differences and far too little to oversupply. Because of the basic structure in agriculture, the farmer is under compulsion to operate at the full capacity of his labor resources. He will adopt innovations—even though output is increasing—so long as unit cost is decreased. The result is that *regardless of the level of price above*

[3] Leaders' superior ability to assess market conditions.

variable costs, the farmer will seek to employ his resources fully. The pressure is always on to produce. Also, batch production processes do not allow intra-seasonal supply adjustment.

Farmers are harmed by the organization and structure of the non-farm economy in a very limited sense—only in an environment of over-supply. They are the victims in a far greater degree of technological progress by which the supply of farm products has continued to rise much faster than the demand.

Lanzillotti lumps together indiscriminately all non-agricultural segments selling to agriculture and those buying from agriculture and makes them his "villains." He fails to recognize wide differences in industries, and that fierce yet constructive competition characterizes many of them. He fails to distinguish between the impact of the structure of the non-agricultural segments on farm prices compared to income. Non-farm structure has little effect upon prices, but has a great effect on income through cost of production for things farmers buy.

In this connection, it should be pointed out that the important cost increases in farm supplies have resulted from wage increases, resulting from the near-monopoly power of labor unions. Organized labor under government sanction permits monopoly power to transfer labor from the weaker segments of the economy—producers and consumers—income not justified by productivity.

I am greatly alarmed at Lanzillotti's implication that little has or can be done to improve farm income through improved farm programs—rather that the answer lies in more vigorous anti-trust action.

I submit in the first instance that farmer cooperative purchasing and marketing organizations have been important in the past and will become even more important in the future in forcing agricultural supply firms and buyers of agricultural products to compete more efficiently. The more than 80 milk marketing orders and 37 fruit and vegetable orders likewise have done much to stabilize prices for and strengthen the bargaining position of the producers involved.

Secondly, his support of the 1950 Amendment to the Clayton Act as the best solution to the problem of low farm income is not supportable. In the first place, more vigorous enforcement of this Act would in my opinion have little if any effect upon farm income. In the second place, more effective enforcement of this Amendment would have had only limited effect on changes in market structure in the last ten years. As far as the food chains are concerned, only 20 percent of the growth in sales of the corporate chains resulted from acquisition. Enforcement of this Amendment would have had the greatest effect upon the small chains, which grew mostly via the acquisition or merger route. Thus it would have had the effect of penalizing the smaller chains relative to their large competitors. The same would hold true for future growth.

DISCUSSION: THE RELATIVE MARKET POWER OF FARM MACHINERY MANUFACTURERS

GEORGE R. SLATER
Citizens National Bank, Decatur, Illinois

As I have interpreted Professor Lanzillotti's paper, it is suggested that (1) the farm equipment industry, among other farm suppliers, is in a position to permit management administration of prices and profits, and that (2) conditions prevail for this industry's monopolistic exploitation of the farmer. Having concluded that these conditions exist, the pursuit of a more vigorous anti-trust policy is advanced as the one wise course to redress this "superior market power."

My brief remarks are directed principally to the questions: (1) Do the managements of major farm equipment firms administer profits; (2) Has the farm equipment industry exploited the farmer? In addition, I shall describe briefly my observations of competitive behavior in the farm equipment industry. Since Professor Lanzillotti has based some of his conclusions upon his interpretation of executive interviews in at least one farm equipment firm, my observations may lead to additional subjective conclusions about the industry's ability to exploit the farmer.

Do farm equipment firms administer profits? It has been suggested that profits are administered through stabilized prices, market sharing and the like, although evidence of overt collusion may not be present. During the 1950-59 period, farm equipment industry profit ratios have fluctuated widely and have tended to decline. For example, from 1950 highs to 1957 lows, this industry's net income after taxes as a percent of sales declined 50 percent while net income after taxes as a percent of net assets dropped 56 percent; net profit margins in cents per sales dollar dropped from 8.3 cents to 4.1 cents during the same seven year span (table 1).

These widely fluctuating profit ratios may not be construed as management determined.

TABLE 1. NET INCOME OF THE AGRICULTURAL IMPLEMENT INDUSTRY GROUP, 1950–59*

Year	Net Income as Percent of Net Assets	Net Income as Percent of Sales
1950	15.6	8.3
1951	11.9	5.4
1952	10.9	5.3
1953	8.1	4.2
1954	6.9	4.4
1955	8.8	5.2
1956	8.3	4.8
1957	6.9	4.1
1958	7.3	4.6
1959	10.8	5.8

* Data published by First National City Bank of New York.

Profit administration through market sharing appears unlikely. No evidence has been presented to support the existence of rigged market shares. The rivalry among farm equipment firms is evidently so great that they will not divulge their domestic sales figures to one another. It is difficult to glean data which is representative of domestic farm equipment industry sales from company annual reports because many farm equipment manufacturers are highly diversified in other domestic markets as well as foreign markets; often their company financial statistics are reported in aggregates only. Reluctance of farm equipment firms to disclose current sales positions may be interpreted as prima facie evidence that market sharing arrangements do not exist, for it would be impossible to share a market if the shares were unknown.

Has the farm equipment industry exploited the farmer? Robert S. Stevenson, president of Allis-Chalmers, summarized the farm equipment industry price inflation problem while serving as president of the Farm Equipment Institute in 1958.[1] He said, "In talking about giving the farmer more for his equipment dollar let's look at the Bureau of Labor Statistics index on prices. Taking 1947-49 as a base, the last index shows that farm equipment prices, as they stand today, have risen 38.3 percent. But during this same period of time, and using the same base years, we calculate at our plant that the weighted average of steel prices has gone up 70 percent. The cost of an hour of labor in our organization—the type required to produce farm equipment—we calculate has gone up 93 percent. These figures show that we have been doing a good job in holding the price line. I am convinced we have done it through mechanization and expert engineering and manufacturing skill."

The prices of tractors, one product of the farm equipment industry, have increased as have the prices of most manufactured products during the post World War II period. However, the farmer does not buy a tractor for the sake of owning a tractor; he buys its services. What are we pricing—the tractor or the work it does? While the price of tractors has increased, the price per unit of tractor power has declined.

I found it interesting to trace the historical development of one particular model tractor[2] from 1935 to date. In terms of 1960 dollars, this is what happened (table 2).

(1) Price increased from $1583 to $1860 or 17.5 percent.

(2) Drawbar pounds pull, maximum, increased from 1728 pounds to 4723 pounds, or 173 percent.

(3) Price per pound of maximum drawbar pull declined from $.92 to $.29, or 58 percent.

---

[1] "We Earn Our Way," address by R. S. Stevenson, Pres., Allis-Chalmers Mfg. Co., Sept. 5, 1958.

[2] Unpub. data, Deere and Co., Moline, Ill. This represents the history of the John Deere Model "B" tractor since 1935.

(4) Shipping weight, pounds, increased from 2455 to 4533, or 85 percent.

(5) Price per pound of shipping weight declined from $.64 to $.41 or 36 percent.

The work output of this model has increased; in 1935 it was used to pull one 16-inch bottom plow while today it pulls three 16-inch bottoms; in 1935 two-row equipment was attached while today four-row equipment is attached. This kind of change in product efficiency does not lend itself to a thesis of farmer exploitation.

TABLE 2. RELATIONSHIP OF SPECIFICATIONS AND PRICES OF JOHN DEERE MODEL "B" IN 1935 AND JOHN DEERE MODEL "530" IN 1960

Item of Price	1935 Model "B"		1960 Model "530"
	1935 Dollars	1960* Dollars	1960 Dollars
Total Base Price	$728.00	$1,583.00	$1,860.00
Price per Maximum Drawbar Horsepower		128.00	54.00
Price per lb. of Maximum Drawbar Pull		.92	.39
Price per lb. of Shipping Weight		.64	.41
Item of Specification		1935 Model "B"	1960 Model "530"
Drawbar Horsepower, maximum		12.37	34.31
Drawbar Pounds Pull, maximum		1728.	4723.
Shipping Weights, lbs.		2455.	4533.

* As of January 1960. The 1935 price was translated into 1960 dollars by multiplying the 1935 price by 2.174, the relationship of the Jan. 1960 Wholesale Price Index for Agricultural Machinery including tractors, as published by U.S. Bu. Labor Stat. (145.9 using 1947–49 =100) to the 1935 index (67.1 using 1947–49=100).

Despite evidence that farm equipment firms are provided with the incentive to press down costs and to improve the efficiency of their products as well as evidence that profits are not administered, the possibility of changing the market structure to that of a classically purely competitive one might be advanced. Since this system in theory would eliminate industry profits in the long run, it could be argued that the redistribution of income and resources would be of advantage to the farmer. Whether this change would benefit the farmer is questionable. In my opinion, the economies of scale and level of innovation provided by the present market structure contribute more to farmers' incomes than the resource redistribution which undoubtedly would be provided by a purely competitive farm equipment market structure. At least, this question bears study before concluding that the present market structure should be altered.

This year U.S. farmers probably will buy less than 200,000 tractors. For the most part, these will be produced by eight major manufacturers.

I shudder at the prospective cost of these tractors were they produced by a great number of firms in a purely competitive market.

In the U.S. farm equipment industry, relatively few firms account for a large share of total sales. These firms are aware of one another, possess considerable knowledge of one another's products, and tend to act upon their own known capabilities and upon their competitors' actions. Each firm produces somewhat different products designed to perform somewhat the same farm operation; and each firm advertises and sells its products in a different way. No single firm is in a position to dominate the supply of regularly produced products; therefore, no single firm can set a particular product price much higher than similar competitively produced products and still sell its own product.[3] A firm will lower its prices if its costs are lower than competitors' costs on a wide range of the industry's products and its management believes it can gain market share and/or profit position. It is difficult for one firm to obtain cost advantages over a wide range of the industry's products because (1) the largest proportion of finished product costs is purchased components and parts from common suppliers, (2) wage rates are similar among firms, and (3) information and knowledge used by the various manufacturers flow through such channels as common suppliers, the press, and the employment of competitors' technical and management personnel.

Under these conditions the struggle among firms to survive, grow and profit results in their tremendous efforts to bring an ever wider selection of higher efficiency products to the farmer. Despite great uncertainties in research, design, manufacture, and marketing, improved efficiency in old products and the continuous introduction of new products results. As already demonstrated, the most likely form of farmer benefits comes from the increased potential services which products offer and the lower relative prices of these services; a less likely form is that firms offer over a period of years an unaltered product at lower prices.

It has been shown that the present competitive structure of the farm equipment industry benefits farmers. The evidence is nil that there have been disappointing market results. If the farm equipment industry is to be blamed for the farmer's plight, it is because its many products, as priced, have enabled farmers to mechanize so fast that other problems of adjustment have been created.

---

[3] In 1956 Willard Arant concluded his paper entitled "Competition of the Few Among the Many" as follows: "One generalization about concentrated industries, as well as about oligopolies in the strict sense of fewness, probably commands widespread agreement, and should be borne in mind in many connections: Imperfect knowledge creates uncertainties, and uncertainties create differences of opinion; sellers whose opinions cause them to prefer a high price are usually forced by the market place, in each short period, to yield to those whose opinions lead them to prefer a lower price."—"Competition of the Few Among the Many," Willard D. Arant, Quar. J. Econ., Aug. 1956.

DISCUSSION: MARKET POWER IN THE MEAT PACKING INDUSTRY

ELLIOTT S. CLIFTON
John Morrell & Co.

In the brief time allotted me I would like to use the following procedure: (a) Quickly review Dr. Lanzillotti's paper and make some comments relative to it, (b) apply his technique of analysis specifically to the meat packing industry, and (c) suggest a possible alternative analytical method which may be more fruitful.

Review of Dr. Lanzillotti's Paper

Briefly, I think that the thesis of the paper is as follows:

1. The concentration of market power is not to be tolerated by the American public.
2. The only realistic way to measure this concentration of power is through the structural relationships.
3. The valid measurements of the degree of concentration of market power are:
   (a) The degree of concentration in the industry,
   (b) the conditions of entry into the industry,
   (c) the type and degree of integration,
   (d) the extent of product diversification,
   (e) the way the firm has organized to minimize risk and uncertainty, and
   (f) the conditions of the industry's supply.
4. Using these measures we find that a great deal of market power does exist in agricultural processing and supply firms.
5. Economic theory and experience show that all such market structures do not perform in a satisfactory manner.
6. The best measure of control of this situation is continued and, perhaps, expanded activities of the Federal Trade Commission.

I believe that all of us who have heard this paper would agree that Dr. Lanzillotti has done an exacting and painstaking job of attempting to verify his hypothesis.

His job is not made easier by his failure to define precisely his terms and objectives. His definition of "market power" is: "A given firm, or group of firms, can be said to possess market power when they individually or in concert are in a position to follow persistently price, product and marketing policies in a manner different from the conduct a competitively structured market would impose upon firms facing otherwise similar cost and demand conditions." Whatever market power a firm or industry has must in some fashion be a function of its supply curve for

products it purchases, and/or the demand curve for the products it sells. Decisions made by the individual firm can change the demand or supply curve for the industry. It is completely inconsistent to try to define a competitively structural market with these cost and demand situations. If any firm, or group of firms, faced the cost and demand structures of a competitively structural industry, it could not have market power. Thus he is in the position of attempting to measure the difference between what now exists and some theoretical "might have been" even though the "might have been" is impossible to clearly define, either practically or theoretically. It is no wonder that he repeatedly is caught in the position of making apologetic statements such as that the evidence is not conclusive, and indefinite value judgments such as that economic theory and practice suggest that the type of situation he describes ordinarily leads to disappointing market results.

A questionable point is the validity of the concept that the public does not want and will not permit a high degree of concentration of economic power. This seems a little strong when we consider the existence and popularity of such firms as Du Pont, U.S. Steel, General Motors, or General Electric. The public is most certainly letting these firms have a great deal of economic power.

If the growth of market power is not to be tolerated, how do we explain the fact that one hundred food and kindred product firms acquired two hundred forty-three other firms in the 1948-54 period and have been continuing at a record pace since that time? The very data presented by Dr. Lanzillotti is contrary to his thesis that the public will not permit the continued growth of private economic power.

The selection of the stability of earnings as a per cent of sales is not particularly effective in measuring the actual market policy and price stability of the firm. There are many ways for firms to adjust their earnings statements to achieve predetermined profit levels. These include:

(1) Use of non-recurring income,
(2) inventory control and pricing of inventory,
(3) deferred maintenance,
(4) budget cuts.

It would take quite a long discussion to thoroughly explain each of these items so I will be very brief.

Non-recurring income can be obtained by the sale of some item or facility where the depreciated value is less than the sales value.

Inventory pricing, such as LIFO, tends to reduce profits due to price rises and to raise income when prices decline.

Deferred maintenance is not repairing equipment, facilities, etc., during lean years and going to the other extreme during good years.

By "budget cuts" I mean a reduction in the budget for items that are

not immediately linked to sales and profits, such as Advertising or Public Relations.

Since most management desires relatively stable earnings at some consistently increasing rate, the above and many other methods of internal operating policies are used to minimize fluctuations in income. To the extent that they are used, stability of earnings becomes less effective as a measure of market power.

There are also many ways to reduce risk and uncertainty and thus stabilize earnings without developing market power. An extreme example would be for a firm to invest a large portion of its capital in Government bonds instead of production facilities. A second way is through diversification into lines of enterprise where the profit cycle is inversely related to that of the existing enterprises. We would not say that a farmer who had predominantly been a livestock feeder but had started raising grain in an attempt to stabilize his income had developed market power.

Furthermore, in any discussion of market power we should remember that it is not static. It must be considered in terms of the time period involved. A firm may have a lot of market power in the short run and little or none in the long run. Also, market power may vary sharply in short periods of time.

Perhaps even more serious, to my way of thinking, is the implicit assumption that any concentration of economic power is bad, without either theory or practice to justify such an assumption. To imply that the development of economic power by industrial firms concurrently with capital accumulation and economic growth is more detrimental than beneficial to the welfare of society is to envision a completely new type of economic system. It would require a lot of study and analysis to prove that there are alternative possible economic systems which would function more effectively than our existing capitalistic system.

As mentioned, Dr. Lanzillotti is inclined to make value judgments without valid statistical evidence to support his contentions. He repeatedly uses his concept of economic theory and practice as a measuring stick for the performance of markets.

If I am permitted the same prerogative of suggesting hypotheses without verifying them, I'd like to suggest that the amount and degree of investigation, court action, etc. which evolve around the exercise of economic power are more closely related to the political power of those who feel that their incomes are being reduced than to either legal or moral considerations. I would further suggest that wherever you have a large block of voters and a relatively small number of firms affecting those voters there will be continued agitation to curb the economic power of the firms and to increase the political and economic power of the voters.

Dr. Lanzillotti's conclusion is that market power can best be controlled by Governmental action. He seems to me naive in thinking that

the heads of bureaucratic agencies are dedicated statesmen who place the objective of the welfare of the country above their own success and welfare. There is just as much reason to believe that the heads of Governmental agencies will take whatever action they think most popular and most likely to advance their personal careers as there is to assume that managers of industrial firms will try to maximize the profit of their firm or advance their position by acquiring a larger business to manage. Both groups of individuals have the same ego drive for success and are likely to proceed toward their personal successes in much the same manner.

I might suggest that wherever a segment of an industry of our country obtains market power which it can exploit there are greater than usual returns for some group to form a similarly strong organization in the area being exploited. Through this development of strength they can appropriate for themselves a portion of the excess profit which is currently being enjoyed by the firm with the market power.

If chain stores get stronger in their buying power than packers in their selling power, chain stores will expand their profits at the expense of the packers. Should such an occurrence take place, then packers would find an increased incentive and profit level either through acquiring more packing firms to improve their bargaining position or through acquisition of chain stores themselves. It is such counteracting power that keeps our economy competitive.

I further believe that the general welfare of the agricultural industry would be better increased by the development of larger producing or marketing units than by Governmental action, if more economic power is needed in agriculture. Certainly, the attempts of the Government to develop market power in agriculture have been a dismal failure to this date.

Market Power in the Meat Packing Industry

Now let us relate some of Dr. Lanzillotti's reasoning to the meat packing industry. In his paper he has defined its general concentration, supply conditions, etc. His major criterion of analysis consists of price and marketing policies as measured by the stability of earnings as a per cent of sales. Let us examine these as related to the meat packing industry.

In Chart 1 the gross margin and live weight of slaughter of hogs from 1954 to date are plotted. The gross margin was determined by taking the live cost of hogs and the value of the carcass as quoted for 200-240 pound hogs in the National Provisioner. The data plotted are on an average weekly basis, by months. The live weight of slaughter was computed from USDA data. Across the bottom of the chart are the total industry earnings and earnings as a per cent of sales as published by the American Meat Institute.

The gross margin, and consequently the profit of the industry, is closely

related to the slaughter volume. If one were attempting to forecast profits from these data they might be refined somewhat, but they clearly show that the predominant single factor related to industry profits is the volume of slaughter of hogs.

This chart also brings to point the fact that the time period may greatly affect the conclusion regarding the extent of market power as determined by the stability of earnings as a per cent of sales. Even though the yearly data show some degree of stability, the monthly gross margin data show extreme fluctuations. Thus it follows that profits vary greatly on a monthly basis. If the firms were able to stabilize purchasing and selling prices, they would not be faced with erratic gross margins and profits on a monthly basis. It emphasizes the fact that the longer the period of time you consider for a firm, the more stable its earnings will be.

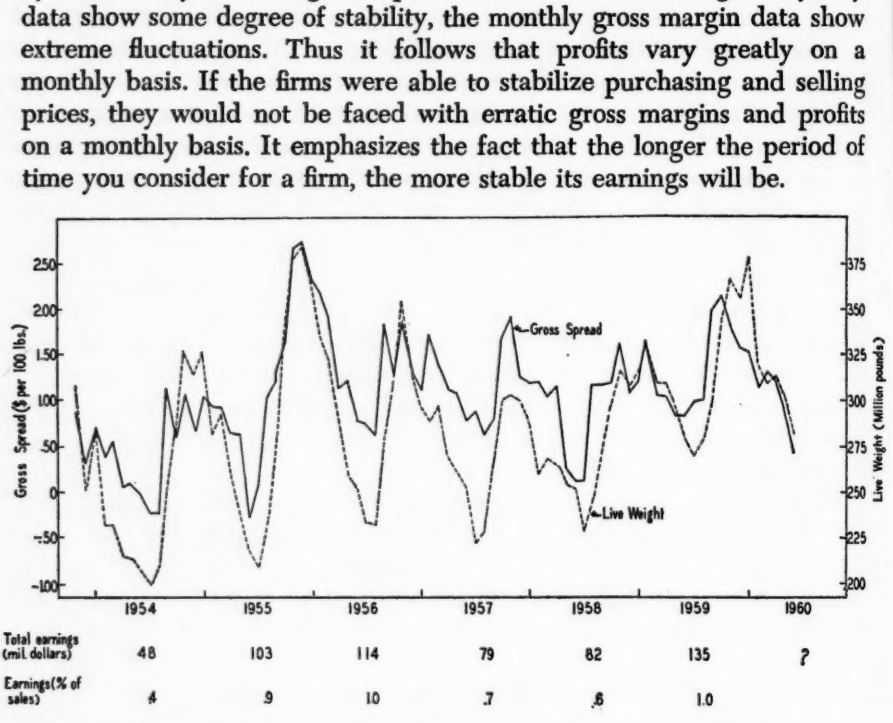


CHART 1. RELATIONSHIPS BETWEEN GROSS MARGIN, FEDERALLY INSPECTED SLAUGHTER, TOTAL INDUSTRY PROFITS AND PROFITS PER SALES DOLLAR FOR MEAT PACKING INDUSTRY, 1954 TO DATE.

The data presented by Dr. Lanzillotti when comparing the top four firms with the top eighteen to twenty-five firms also would indicate an absence of market power in the meat packing industry.

We can hardly escape noticing that if the meat packing industry wants to stabilize its earnings, one way is through a consistent supply of raw materials. This need will undoubtedly lead to integration or some other measure of assuring a high level and stable supply of raw materials very rapidly in the future.

To this point I have been critical of the analysis by Dr. Lanzillotti and have showed that his method would indicate a relatively low level or

absence of market power in the meat packing industry. I do not believe that any one of us here really believes that the major packers have little or no market power. We all know that the larger packing firms face increasing cost curves for supplies and decreasing demand curves for their products.

The purpose of this discussion is not to show that market power does not exist or that no action should be taken if firms achieve undue economic power, but to show the fallacies possible if one puts too much emphasis on the point where correction is needed based upon such inconclusive evidence.

I do not believe in being critical of an analysis unless some alternative method is presented by the critic as being a better way to make the analysis, so I will briefly try to show a method of analysis which has promise of closing some of the loopholes in Dr. Lanzillotti's paper.

"Market Power" Redefined

First, let me attempt to define "market power" in such a way that it can be measured. In the following presentation, "market power" is "that effect which a firm or group of firms may have, individually or collectively, in a market place, which other firms in the industry cannot immediately alter, no matter what action they take." Thus, when a firm makes a price or marketing policy decision in a market which changes the structure of that market and the other firms in the market cannot keep this change from taking place, it has market power. The extent of the change in the market is a measure of that firm's market power. It is apparent that a firm has market power when it can make policy decisions regarding a market which cannot, or will not, be offset by competitors.

In using this definition I want to ignore the welfare connotations of changes in income distribution and preconceived ideas relative to the equity of such pricing policies.

More Than Two Person, Non-zero Sum Game Theory

A technique which I believe might have fruitful results if applied to this area is that of More Than Two Persons, Non-Zero Sum Game theory. My own particular analyses in this general area deal with market strategies in a market, but one by-product, namely the value of the game, would seem to be a clear-cut measure of the market power of the firms involved in the market.

A complete analysis of a market strategy study would require much more time than I have, so I decided to give a brief illustration using a simplified analysis of as close to a real situation as possible.

Suppose we take a market such as St. Paul where we have two firms such as Morrell and Hormel, which are two of the dominant firms in the

market. Since these names are somewhat similar a lot of promotion and advertising of one firm will benefit the other somewhat, so that their interests do not necessarily conflict. Suppose also the following:

(a) We are considering four types of advertising and promotions—
  (1) Newspaper with coupons,
  (2) radio quiz program,
  (3) television ball game series,
  (4) dealer loader and bill-back promotions,

(b) there is a fixed total demand for meat in the area but the increase of sales and income of one does not necessarily decrease the income of the other.

(c) that the rest of the industry will ignore advertising and promotion by Hormel and Morrell,

(d) that we have conducted experimental design studies or otherwise have measured the effectiveness of each of these marketing strategies and have related this to profits so we know the pay-off matrix for both firms and the rest of the industry.

(e) the constructed pay-off matrices are as follows:

Matrix A — From Viewpoint of Morrell

	Hormel				
Strategies	1	2	3	4	Solution
1	1	2	3	5	$\frac{1}{2}$
Morrell 2	2	1	2	3	0
3	3	2	1	2	0
4	4	3	2	1	$\frac{1}{2}$

Value of Game 2.5

Matrix B — From Viewpoint of Hormel

	Morrell				
Strategies	1	2	3	4	Solution
1	4	3	2	1	$\frac{2}{3}$
Hormel 2	3	2	1	2	0
3	2	1	2	4	0
4	1	2	4	7	$\frac{1}{3}$

Value of Game 3.0

Matrix C — From Viewpoint of Rest of Industry

Strategies	1	2	3	4
1	−5	−5	−5	−6
2	−5	−3	−3	−5
3	−5	−3	−3	−6
4	−5	−5	−6	−8

where each figure in the matrices is in thousands of dollars.

From Matrices A and B you can see that if both Morrell and Hormel pursue marketing strategy 1, Morrell will Make $1,000 (Matrix A) and Hormel will make $4,000 (Matrix B). The other packers will lose $5,000 (Matrix C). This third matrix was necessitated by the assumption that the total market demand for meat products remained the same.

The above matrices were solved by the symmetric method, for which I am indebted to Dr. J. Tolacko and Terry Rockafellar of Marquette University.

The solution to Matrix A for the optimum strategy for Morrell is as follows:

Strategy	*Use of Strategy*
1	50% of the time
2	0% of the time
3	0% of the time
4	50% of the time

If Hormel wanted to minimize the effectiveness of Morrell they would employ the strategies as follows.[1]

Strategy	*Use of Strategy*
1	0% of the time
2	50% of the time
3	50% of the time
4	0% of the time

The value of the game in Matrix A is 2.5 or $2,500. This, then, is a measure of the *minimum market power* of Morrell in the market since no strategy of the competition can cause Morrell to make less than $2,500 if Morrell randomly applies Strategies 1 and 4.

Since Hormel is more interested in making the most profit that they can instead of limiting Morrell's profits, they must consider Matrix B. The solution to the problem as viewed by them gives the following strategies:

Strategy	*Use of Strategy*
1	67% of the time
2	0% of the time
3	0% of the time
4	33% of the time

The value of the game is $3,000. Even if Morrell tried to prevent Hormel from making money, the least amount to which they could limit Hormel's profit would be $3,000, so this is a measure of Hormel's *minimum market power* in this situation.

If one cares to follow the analysis a bit it would show that if Morrell followed their optimum strategy and Hormel followed theirs, then Morrell's profit would increase to above the $2,500 level and this might be termed Morrell's *effective market power.*

[1] There are alternative optimum defensive strategies for Hormel, which I will ignore in this discussion.

If we pause now and look at the original matrices we see that the optimum strategy for Morrell and Hormel if they were in direct collusion would be for both to play strategy 4 all the time. The total take at this point would be $8,000 with Morrell getting $1,000 and Hormel $7,000. Since Morrell could get $2,500 through using their marketing strategies, it is unlikely that they would settle for $1,000.

From the viewpoint of market strategy this analysis could be carried much further and strategies developed which would attempt to get the opposition to adopt marketing strategies which would not hurt them and yet would let the firm doing the analysis get more than their minimum. Since the purpose of this illustration, however, was to show a method in measuring market power instead of developing marketing strategies, I will not pursue the issue beyond this point.

The illustration has been carried far enough to show that it might have some merit in determining areas where collusion, either explicit or implicit, may be involved. It also promises some precision of measurement of the minimum and effective market power that a firm or group of firms have at a given time.

The major drawback to this type of analysis is the collection of data that are applicable, since it would require that the marketing decisions and their effects be closely observed and their effects measured.

Since most large industrial firms are most likely to be making such analyses in the future and gearing many of their marketing decisions to studies of this type, it seems imperative that researchers in the area of structural relationships such as market power seriously consider the application of such methods to future research.

INTEGRATION REVISITED

CHAIRMAN: R. L. MIGHELL, AGRICULTURAL RESEARCH SERVICE, USDA

INTEGRATION IN PRACTICE—THE BROILER CASE*

W. R. HENRY AND ROBERT RAUNIKAR
North Carolina State College

THIS PAPER has two objectives. The first objective is to outline the economic forces which led to massive vertical integration in the commercial broiler industry. The second objective is to explore some of the long-run social, political and economic implications of this particular example of vertical integration in agriculture.

As used in this paper, vertical integration means any arrangement by which a decision-maker in one stage of production acquires control of inputs, processes, or output levels in a vertically separated stage. The definition embraces control by acquisition of facilities used in the separate stage, by contracting these facilities, or by an informal understanding kept effective by mutual benefits.

Forces Leading to Vertical Integration

This part of the paper is based upon a simple analytical device. We assume a hypothetical broiler industry without vertical integration, subject this industry to realistic conditions, and isolate some economic forces leading to vertical integration. The development partially follows suggestions by other authors and particularly by Collins, Kohls, and Trifon.[1]

A hypothetical non-integrated broiler industry

Consider the flow diagram of Figure 1. Each stage of production for ice-packed broilers is represented by an appropriated labeled block. Each spot market existing with no vertical integration is represented by an appropriately labeled arrow. Decision-makers at each stage are assumed to choose inputs, processes, and output levels on the basis of expected future conditions in the relevant spot markets.

The hypothetical industry operates under the following realistic conditions:

(1) For all spot markets represented by a solid arrow, perishability of

* Approved by the Director of Research of the North Carolina Agricultural Experiment Station as Paper No. 1239 of the Journal Series.

[1] Norman R. Collins, "Changing Role of Price in Agricultural Marketing," *J. Farm Econ.*, Aug. 1958; R. L. Kohls, "Decision-Making in Integrated Production and Marketing Systems," *J. Farm Econ.*, Dec. 1958; Raphael Trifon, "Guides for Speculation about Vertical Integration of Agriculture with Allied Industries," *J. Farm Econ.*, Nov. 1959.

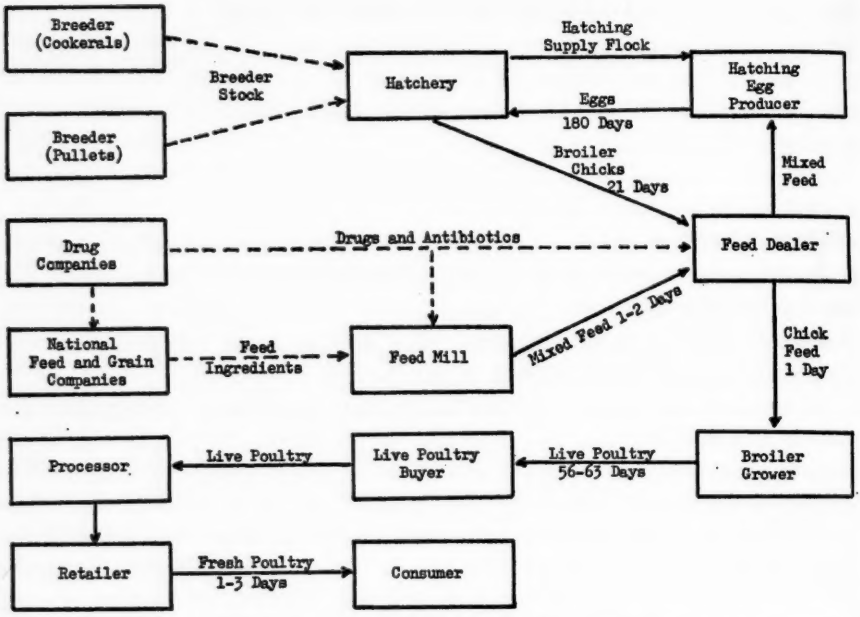


FIGURE 1. FLOW DIAGRAM FOR BROILER PRODUCTION AND MARKETING WITH ESTIMATED ELAPSED TIMES BETWEEN STAGES

the product precludes a wide geographical base, substantial storage, and professional arbitrage and speculation. Thus, each of these markets is "thin" in the sense that prices are highly sensitive to local variations in volume.

(2) Each broken arrow leads away from a stage of production requiring great capital investment and highly complex technology.

(3) Hatching egg production and broiler growing are geographically dispersed among relatively small production firms, while other activities are geographically concentrated into relatively large production units.

(4) Retailing is characterized by supermarket merchandising requiring products of uniform quality.

(5) Demand at the consumer stage is seasonally variable.

(6) Technology is developing at a rapid rate in the breeder, drug company, and feed manufacturer stages and at a substantial rate in the remaining stages.

(7) Competition is effective in all spot markets and keen in those spot markets represented by solid arrows.

Quality problems in the spot markets

To reach equilibrium from the point of view of product quality, the industry must attain optimum balance between preferences of consumers (as reflected in premiums or discounts for variations in product quality)

and production possibilities of firms in various stages of production (as reflected in the cost differences associated with quality variations). To efficiently transmit information about effects of quality variation, each spot market would have to establish a large group of prices providing premiums or discounts for variations in quality, and the variations in product qualities would have to be readily observable or measurable.

Only one spot market in Figure 1 meets the above requirements. This is the market between the processors and the retailers. In the vertically preceding spot markets, important variations in product quality may be completely concealed. The real quality of a particular bird is unknown until this bird is defeathered and disassembled during processing.

By integrating backward, processors can achieve direct control over product in preceding stages. Integration for quality control can be expected eventually to proceed back across all of the solid arrows, since each of these stages of production involves manageable financial and technological efforts.

Volume problems in the stages of production

For industry equilibrium from the point of view of volume, producers at all stages of production must arrive at compatible output goals. The hypothetical industry might be expected eventually to develop compatible output goals if demand for the end product were sufficiently stable through time for producer and consumer preferences to come into balance. However, it must cope with seasonal demand declines so severe that end product price in seasons of low demand cannot fully cover variable unit costs with the entire industry operating at design capacity. The industry as a whole must reduce volume during these seasons.[2] This problem leads to localized volume and price instability that can reach wild dimensions.

The intriguing problem of determining optimum volume strategy for an individual firm operating under the above conditions cannot be undertaken here. However, the economic outcome for the individual firm also depends upon strategies of other firms in the same stage and upon strategies of firms in vertically separated stages. A rational decision-maker would operate at design capacity if expected product price exceeds expected total variable cost per unit and would reduce output to a level just sufficient to maintain "satisfactory" relationships with "regular" suppliers and customers if expected price is below expected total variable cost. "Satisfactory" relationships would return to output at design capacity under favorable market conditions.

[2] During recent years, the annual output of the broiler industry has averaged about 85 percent of the design capacity indicated by the volume during the two month period of peak production.

Deviations from desired volume have greatest effect upon net returns in stages of production where fixed costs are highest. Figure 2 shows composition of fixed cost for a typical southeastern production and marketing complex composed of a hatchery, feed mill, broiler growers, live haulers, and a processing plant. On the basis of this figure, it may be suggested

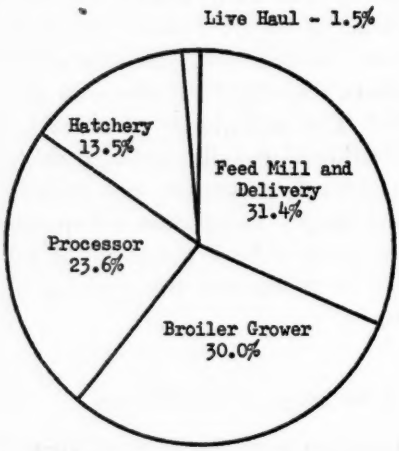


FIGURE 2. COMPOSITION OF FIXED COSTS FOR A TYPICAL BROILER PRODUCTION AND MARKETING ORGANIZATION

that the live-hauler has relatively little incentive for vertical integration to achieve localized volume control, that the hatchery has some incentive, and that the processor, broiler growers, and feed mills stand to make substantial gains.

Problems in spatial organization[3]

For industry equilibrium from the viewpoint of spatial organization, broiler production density (broilers/square mile/year) must adjust to a level at which further increases involve more increase in the unit return to broiler growers (as an incentive to increase production density) than the potential amount of reduction in unit servicing and assembly cost (by reducing average length of haul). In the hypothetical industry, a complicated pricing scheme would be necessary to obtain this result. One workable scheme is as follows: (a) The hatchery would use a mileage charge in pricing delivered baby chicks; (b) Feed dealers would use a mileage charge in pricing delivered feed; (c) Live haulers would base hauling charges upon the lengths of haul; (d) Processors would purchase live broilers on the basis of plant weight. This scheme provides a higher net

[3] For a detailed analysis of economies of spatial organization in the broiler industry, see W. R. Henry, J. S. Chappell, and J. A. Seagraves, *Broiler Production Density, Plant Sizes, Alternative Operating Plants, and Total Unit Costs*, Tech. Bull. No. 144, N.C. Agri. Expt. Sta. (June 1960).

return to nearby broiler growers than to remote growers. However, adjustment to optimum density might take quite a long time.

If an off-farm firm produces broilers in its own housing, using hired labor, adjustments to optimum production density are under direct control and can be swiftly made. For an integrated firm that lets contracts to growers, adjustments are not much more difficult. Thus, potential gains from economies of production density can provide powerful incentives for off-farm firms to integrate.

Figure 3 shows composition of added broiler servicing and assembly cost due to increases in length of haul to broiler farms. Feedmen can capture most savings from reductions in length of haul by integrating into broiler growing and live hauling. On the other hand, hatchery men or processors would have to integrate these activities and also feed servicing.

Problems of growth and change

The broiler industry continues to make substantial advances in breeding, nutrition, flock management, flock servicing, processing and transportation. These advances are accompanied by price reduction and out-

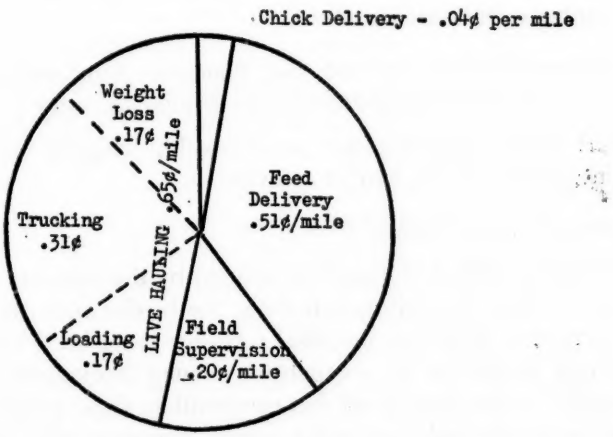


FIGURE 3. COMPOSITION OF ADDED COST WHEN AVERAGE LENGTH OF HAUL TO BROILER FARMS IS INCREASED

put expansion. In order for technological innovations and expansion of the industry to take place, the broiler growers require both technical assistence and new capital. Some off-farm firms have access to new techniques and new capital on very favorable terms. In particular, feed manufacturers provide a steady flow of research findings to the feed dealers and assistance to include co-signing in tapping commercial credit sources.

Therefore, the hypothetical broiler industry, with each firm completely independent, can be expected to undergo structural change because of

innovation and growth. Feed dealers can be expected to extend technical assistance (fieldmen) and financial assistance (feed on credit, as a minimum) to the growers. The risk position in broiler growing taken by the feed dealers leads them to impose certain restrictions on the growers (that birds will be produced and marketed under the direction of the dealer).

From this condition, contract broiler production is an easy step involving only an increase in the risk position of the dealers. This step might be taken if the only incentive were the desire of both the dealers and the growers for a rapid expansion of output.

Appraisal of the forces leading to vertical integration

When a hypothetical non-integrated broiler industry is subjected to realistic operating conditions, spot market communication among stages of production is inefficient and several general types of problems arise. Vertical integration is an effective way of dealing with each type of problem and must extend into the broiler growing stage in each case. Solutions for the problems yield reductions in costs and/or increases in revenues to pioneering integrators. Other firms are eventually forced to integrate in order to meet competition. Assuming freedom of entry, property exchanges, and rights to make contracts, vertical integration emerges as the dominating organizational structure.

Long-run Social, Political, and Economic Implications of Vertical Integration in the Broiler Industry

This part of the paper explores some possible long-run implications of vertical integration in the broiler industry.

"Big Business" versus "Labor"

The traditional role of "farmer," as defined by the interests and associations of the player, may disappear from the broiler industry. It is presently preserved in a greatly modified form for some broiler growers and hatching egg producers by competition among integrators in localized broiler supply areas. Because of this competition, these people still retain some independence and bargaining power. However, this independence and bargaining power could be eliminated by horizontal amalgamation among the vertically integrated firms.

There are several reasons for expecting horizontal mergers among the vertically integrated firms. Legal and financial aspects of such mergers are fairly simple. Businessmen who head the present firms are not of equal ability, and gravitation of resource control to the most capable of these men is probable. Furthermore, potential gains from increased bargaining power are powerful incentives for amalgamation.

If this development does occur, off-farm firms will become rather fully

identified with what is known in America as "Big Business." Some already belong in this group.[4] On the other hand, interests of producers at the farm level will become centered upon the price received for their services. Faced by superior bargaining power of off-farm firms, they will attempt to develop countervailing power through "labor" organizations. Efforts in this direction have already been made, and the issue is not whether the organizations will eventually be formed but to whom the growers will look for assistance.[5]

As the social-political-economic roles of integrators and integratees become more sharply defined, some traditional friends of the "farmer" will be forced into new roles. Land-grant colleges will find opportunities for applied research increasingly limited as research efforts of breeders, drug companies, feed companies, and equipment companies are intensified. The colleges will turn to basic research in genetics, nutrition, environmental effects, product physiology, decision-making, and business strategy. The role of the agricultural extension service will be even more sharply curtailed. Extension specialists may still have much of interest to say to decision-makers of vertically integrated and horizontally amalgamated broiler firms, but the county agricultural agent will be ignored and unwelcome.

At times—too many broilers

Prior to the advent of vertical integration, the broiler industry was subject to intermittent periods of over-expansion and price distress. Many observers, including some economists, hoped that vertical integration would decrease this problem. However, it is now apparent that really massive horizontal amalgamation, bringing control of the broiler industry into hands of a very few decision-makers, would be required if this problem were to be diminished. It is too early to say whether amalgamation of such dimensions is likely to take place. If it does, the process will extend over a long period of time. For many years to come, industry expansion will continue to be erratic, with occasional over-expansion.

In the past, the most severely distressed minority groups have called

---

[4] Consider the interests and associations of one pioneer integrator. With about 1000 employees, 250 of them farmers, he operates a breeding and hatching program, has a grow-out program, packs fresh, frozen and pre-cooked chicken in retail and institutional form, distributes through local and field warehouses with a fleet of 13 semi-tractor trailers, has a by-product division that renders offal and converts old broiler litter to a commercial fertilizer. Active in industry trade associations, he has also been president of the state Chamber of Commerce and a director of the National Association of Manufacturers. "An Interview with Jesse Jewell," *Broiler Industry*, March 1959.

[5] Texas broiler growers organized an association and requested the Butcher's Union, AFL-CIO, to see what it could do to help them. A few months later, the American Farm Bureau Federation announced its readiness to assist contract producers in bargaining for terms of hire.

for initiation of government broiler programs. Each successive period of prolonged price distress has developed more support for these proposals. If such periods continue, the majority of the integrated firms may at some time become united in a demand for governmental assistance in overcoming this problem.

The combination of vertical integration, independence of cropland, and perishability of the product would lead to unusual administrative and technical problems in the operation of a government broiler program. Our profession could make a contribution by investigating alternative possibilities for eliminating the genuine distress and considerable social waste which accompanies an over-expansion of this industry. So far, we have provided only one serious effort in this direction.[6]

Will Vertical Integration Spread from the Broiler Industry to Other Segments of Animal Agriculture?

Much of the discussion, concern, and alarm aroused by vertical integration of the broiler industry can be attributed to the possibility that forms of vertical organization developing in the broiler industry could be extended into and come to dominate other segments of animal agriculture. If this should happen, "family farming," with social and political values cherished by many people, might be practically eliminated from the American scene.

Consider the following extract from an interview with an Arkansas businessman: ". . . Q. Your new corporation . . . is unusual in many respects. For one thing, you have brought together under one corporate structure 10 feed dealers for the purpose of a combined livestock and poultry program. Is that correct? A. Yes. at present, our 10 dealer directors have 2½ million broilers on feed and 100,000 breeder hens. We intend to expand this operation and diversify in milk, table eggs, turkeys, beef, and pork. The idea is to integrate vertically in each of these types of livestock production while diversifying feed mill production. . . ."[7]

Large broiler integrators may in the future make substantial extensions of their operations into other sectors of animal agriculture. Price risk is reduced by diversifying across commodities. Overhead economies can be achieved by full-line operations in feed mills, due to stabilizing effects on tonnage, greater flexibility in ingredient purchasing and blending, and more efficient use of fieldmen. Broiler production and livestock production are complementary in some areas because the value of old broiler litter in pasture improvement is much greater than its value in such alternative uses as crop, garden, or lawn fertilization.

On the other hand, vertical integration will be extended into other seg-

[6] John W. Mamer and Thomas C. Morrison, *Feasibility of Marketing Orders and Production Controls for the Poultry Industry*, Bull. 351, Univ. of Conn. Agr. Expt. Sta., Dec. 1959.

[7] "A 10-Dealer Merger in Arkansas," *Broiler Industry*, July 1959.

ments of animal agriculture on a grand scale only if it produces advantages over spot market coordination of industry stages comparable to those found in the broiler industry. Do such advantages exist in other sectors? Let us examine a few.

For table eggs, problems of quality control under non-integrated conditions are probably greater than for broilers. Variations in quality may be concealed until eggs are broken out by the ultimate users. Problems of localized volume instability are not comparable to those for broilers. Eggs are less perishable than broilers, demand is less seasonal, the production period is longer, and fixed costs in the non-farm facilities are of much less importance. In areas where most of the feed for laying flocks is hauled out from feed mills, potential economies of efficient spatial organization are probably comparable to those in the broiler industry. For the industry as a whole, little or no expansion is expected, and technological progress certainly does not compare with that of the broiler industry. However, some re-location of the industry is in process with the South expanding as some other areas decrease. In the South, many potential producers are short of capital and do not have mastery over existing production technology. Therefore, contract egg production and other forms of integration can be expected eventually to dominate the egg industry in the South. In other regions, the industry may be able to operate efficiently without integration. However, the need for quality control at the laying flock level will probably lead to eventual domination of the industry by relatively large specialist producers and marketing through "agreements" rather than through pure spot markets.

For turkeys, problems of quality control under non-integrated conditions parallel those for broilers. Problems of localized volume instability are not as great. Practically all turkeys are frozen after processing, the production period is longer, and fixed costs are of somewhat less importance. Potential economies of efficient spatial organization are of smaller order. Expansion and technological progress are at a slower rate. However, the large investment required for a flock of turkeys that can provide full employment and reasonable family income, combined with disease risks greater than those in any other sector of animal agriculture, means that many producers must look to off-farm sources for a combination of financial and technical assistance. Thus, vertical integration, which has already enveloped much of the turkey industry, may eventually be as dominating as it now is in the broiler industry.

For beef and pork, quality control problems under non-integrated conditions appear to be minor compared to those for broilers. Problems of localized volume instability are relatively insignificant. In live form, the animals can be shipped over long distances and many of the processed products can be held for considerable lengths of time. Therefore, red meat markets are "broad" on both sides of the processor. For full-line

meat processors, fluctuations in supply of one type of livestock can be partially offset by out-of-step fluctuations in another type. Potential economies of efficient spatial organization are insignificant compared to those for broilers, since few inputs are hauled out to livestock farms and the marketable animals can be economically transported over great distances. Expansion and technological progress are relatively slow, and price and production risks are not comparable to those for broilers. Livestock producers, at least those operating on a large scale, can obtain financing on terms nearly as favorable as those available to any related off-farm business. The potential inherent advantages of vertical integration in the livestock industry appear to be insignificant. However, broiler integrators may enter this industry for reasons already mentioned.

In dairying, quality control problems have already been solved by placing legal requirements on producers. Localized supply problems have been solved by establishing milk marketing orders, placing various forms of restrictions on entry, and processing seasonally excess fluid milk into storable products. Economies of spatial organization have largely been exploited. The industry is characterized by producers who are financially able and technologically up-to-date. Dairying would make a very suitable complementary enterprise for diversification by broiler integrators, but entry into the field is difficult and may be impossible in many cases. For the dairy industry as a whole, vertical integration is not likely to reach great proportions.

Summing Up

Vertical integration and horizontal amalgamation may eliminate the traditional social-political role of "farmer" in the broiler industry. Vertical structuring does not eliminate an important social problem associated with periodic over-expansion of the broiler industry. Vertically integrated broiler firms may extend their activities into other sectors of animal agriculture, but none of the sectors inherently have advantages of vertical integration comparable to those in the broiler industry.

DISCUSSION: INTEGRATION IN PRACTICE—THE BROILER CASE

EWELL P. ROY
Louisiana State University

Although Dr. Henry's definition of vertical integration is acceptable, it may be wise to further clarify his definition, since "definition" alone has been one of our problems, especially in dealing with the public. For example, vertical integration may include: (a) Quasi-integrative arrange-

ments in the sense that grower and dealer simply agree on certain provisions but the entrepreneurial risk in growing broilers remains with the grower. This type of contracting is no longer existent in the South but may be elsewhere. (b) Vertical integration through contract, the type which has attracted the most publicity, where the grower no longer has entrepreneurial risk and is in fact a wage laborer. This type, too, is declining in importance in the South but seems to be gaining elsewhere in the country. (c) Complete ownership integration, which is presently gaining, where integrators have absolute control over the facilities, assume entrepreneurial risk, and maintain a regular company payroll, with no contracting per se. Cooperatives and their integrative ventures in the South is a special case omitted here. Of course, some integrators may have a combination of the last two types of integration rather than all one or the other. Another point is that broiler integration involves a lot more than simply vertical integration. In fact, circular integration or joint horizontal-vertical combination is more nearly the case. These ramifications have been covered before, especially in the December 1958 proceedings of the *Journal.*

The discussant is intrigued with Dr. Henry's hypothetical non-integrated broiler industry mainly because of personal experiences in the broiler integration fiasco at the time of a dissertation in 1953 dealing with the very same thing. In 1953, the discussant also was forced to isolate the cause or causes for broiler integration and, as it is recalled, point No. 3 of Dr. Henry's "realistic conditions" was given top priority at that time. The conclusion reached in 1953 was about as follows: "Broiler growers are atomistic firms; dealers are not, hence they were and are monopolistically competitive. Thus, the growers could no longer take all the risks. It was recommended then and still remains that growers abdicate entrepreneurship and join the combine assuming that there is more hope for economic salvation within a combine than without."

Now for Figure 1. Later in this discussion, an attempt will be made to come back to his Figure 1 and specify or suggest a possible place or method for broiler supply control. Before that happens, let me comment on a few other things.

Dr. Henry is right in relating fixed cost to integration developments. In the South, it was the dealer-grower who integrated first; then came the processor and the hatchery as a general rule. In some areas today, the processor is still not in the integration complex, as witnessed by the success of live broiler auctions in Arkansas, Texas, Alabama, and Georgia. In North Carolina the live auction failed, due possibly to stronger processor integration. In Maine no auction exists because the processors there are even in more complete control.

Dr. Henry's production density thesis is further supported by the fact

that complete ownership integration is being justified largely on this point, although there are other reasons (see Figure 3).

My thesis is that complete ownership integration will be rather slow in coming because of capital tightness and management deficiencies, of which more will be said of later.

A brief comment is needed now on the present competitive situation under broiler integration. The discussant leans more and more to Stigler's hypothesis that regardless of vertical integration, perfect competition may still come closer to describing the situation than any other type of market structure, especially in broilers, where horizontal integration at its worst has yielded the leading firm in the USA with only 2-3 percent of the total national supply. Regionally, the figure is more impressive, but then the figure is not worth much regionally. This hypothesis is somewhat bolstered by a recent letter from the Anti-Trust Division to Congressman Perkins Bass of New Hampshire, who had asked the Justice Department to try and bring some monopoly indictment against broiler integrators. This letter states in the name of the Anti-Trust Division that no basis whatever exists for monopoly prosecution because Anti-Trust found that no supply control was in evidence, no barriers to entry, no price control and no dominance of firm. The letter implies also that the test of price control at the retail level was found to be negative with no strong product differentiation. Anti-Trust cases have rarely dealt with vertical combines, only horizontal ones, or more correctly, circular combines.

From here on, your discussant may disagree with Dr. Henry on several points. Dr. Henry claims that the farmer may disappear from the broiler industry—the fact is he already has, in the traditional definition of a farmer.

Dr. Henry suggests further amalgamation on the horizontal level but he should have specified which level or levels because, after all, there are the feed-milling, growing, hatchery, processing and other horizontal levels. We note now more horizontal integration in hatcheries, but expansion in numbers of feed mixing units, although the supplement mixes of the larger companies are used.

Your discussant does not agree that labor unions will come among broiler growers. The AFL-CIO he refers to has been a dismal failure. NLRB elections of recent date in processing and feed-milling plants in the South have been almost unanimously rejected. Another point is that before an integrator in the South will deal with a union of growers, he will concentrate all his operations through ownership integration, leaving the union high and dry. Another point is that if North Carolina growers unionize and Arkansas growers do not, or vice versa, the one with the union had better get out of broilers quick. Only through massive union activity across several states could any success be achieved. No such

move is contemplated, and if one were it would surely fail. If live broiler prices were 16 cents and cost of production 15½ cents, how could any broiler integrator afford to raise contract terms while his competitors did not?

Your discussant does not subscribe to the theory that the land-grant college is doomed under integration—it will be doomed only if we let it, or if we are so complacent and so afraid to venture that we lose by default. Basic research has been and should continue to be our main piece of artillery. We just need better and bigger artillery to fight this war and could use a few rockets and missiles. Also, instead of exporting ag economists abroad, we need rather to tackle the really big problems here at home.

Dr. Henry is concerned lest we continue to have periods of overexpansion and price distress. In other words, what he is saying is that there is nothing wrong with the broiler industry that a monopoly would not cure. May we add that many other industries would like to see the same Utopia, but, to me, this cyclical behavior is not serious. He concludes that only massive amalgamation would help. Your discussant agrees it would help some integrators but not society, not the growers and certainly not the broiler chicken industry.

If Dr. Henry is interested in monopoly control, your discussant suggests that we return to Figure 1 and look at the breeder-cockerel and breeder-pullet categories as a fine place for monopoly control.

Up until a few days ago, we had eight of these breeder firms accounting for 90 percent of the foundation stock. Then the top two firms merged in June 1960, which involved Nichols of New Hampshire and Arbor Acres of Connecticut, leaving only seven. Last year Congressman Brown of Missouri invited these firms to meet with him to discuss ways and means of effecting a monopoly to control breeders going to hatching egg flocks. The breeders told him then that it was all right with them if he could persuade the Anti-Trust Division of this Holy Alliance and perhaps also introduce a bill in the Congress to clear the air. None was forthcoming, so apparently some breeders are now trying the merger route. Your discussant maintains that if anyone is interested in creating a monopoly in the broiler industry that he should first investigate the primary breeders as a good starting place.

Dr. Henry suggests another route of salvation, that is, the government. Your discussant does not believe that any type of government control would work in broilers except one, with the primary breeders. If people want the government to control, then it is suggested that the Congress allow the seven primary breeders to come to Washington, D.C., help organize a bureaucracy, and ask the breeders to allocate hatchings among themselves on a historical quota basis and also charge say one cent per

egg set to defray the cost of administration and to permit the agency to license breeders. This is the only way that successful government control could be effected and then your discussant would still have some doubt lest some breeders bootleg eggs and chicks. So far, these breeders are not integrated with others; they specialize in male or female lines, fix unit prices but do not control supply.

Lastly, your discussant disagrees with Dr. Henry on the point that broiler integrators may integrate hogs, eggs, etc. We at LSU recently completed a research project on management of broiler integrators and concluded that these integrators could hardly manage their own affairs at present.

John Spring in his study of integrated broiler companies concluded as follows: "The weakness of integrated broiler companies may be attributed to two factors: (a) infancy of the industry and (b) oneness of ownership and management." While these are being corrected as the industry matures and as professional managers take over in whole or in part from the original owners of the business, a lot still remains to be done in broiler management.

My views on integration in other lines of agriculture need not be repeated. Your discussant presented those views at the Winnipeg meeting in August of 1958. Referral to this paper will indicate views held then and now.

In concluding, one has to say that the bargaining strength of the contract grower remains the vital issue. What are the alternatives here? (a) Labor union, for which prospects are slim in the South. (b) Co-op bargaining agency such as the one recently organized in Prattville, Alabama, deserves some study. (c) If ownership integration develops fully, then contract growing will cease and company payrolls will take over, which may then be subject to more successful union activity. (d) Congressional action on having the wage-and-hour law apply to contract growing, although compliance and enforcement is difficult here. Agricultural economists could render a service in outlining and researching these and other alternatives.

In revisiting broiler integration, your discussant thought surely that Dr. Henry would revisit the broiler contract itself, its provisions, changes in method of compensation, efficiency clauses, and of course discuss the live broiler auctions. Since he chose to omit this, this topic will be passed although it should have commanded some attention. A lot more research needs to be done in this area because the economists can serve a vital function in meeting impartially with both parties to the contract. While researching, he can do an extension job and while extending, he can do a research job simultaneously by having access to records, financial statements and the like.

Conclusions

Since the Congressional hearings on broilers three years ago, we can re-visit as follows: (1) That economic integration did continue with but few instances of retreat, (2) That growers' contracts were improved as far as efficiency clauses were concerned, (3) That growers' have fared relatively better in recent years than the integrators themselves, (4) That this in turn has caused integrators to move into their own broiler growing operations except as limited by their capital and management organization, (5) That mergers of integrators in various phases of the broiler industry have occurred and will probably accelerate, but (6) That sufficient market competition presently exists to prevent consumers from being exploited.

INTEGRATION IN THEORY WITH AN APPLICATION TO HOGS

O. P. Blaich

THIS PAPER is primarily theoretical. It proposes: first, to provide a conceptual frame work of the vertical structure of firms; second, to define briefly the elements of a basic model which emphasizes changes in vertical structure; and, third, to demonstrate the logic of the theory in the light of structural changes that are in evidence in hog-production and its adjacent sectors. The purpose is not to destroy or to supplant the existing theory of the firm, but rather, to add to it through the introduction of a vertical dimension as an explicit variable relevant to decisions in the general area of vertical integration.

Vertical Structural Theory of the Firm

In conventional production theory the unit of inquiry is the firm. Its technical production possibilities are usually defined by a function that relates inputs to various levels of output. Commonly, the firm and the production function are synonymous and the vertical structure is implicitly assumed to be unchanged throughout the period of analysis.

But the vertical structure of a firm does change over time; vertically related processes are added and discarded in response to changes in the environment. The added process is sometimes transferred from another firm; at other times, the added process is new to the existing vertical series of production events. On the other hand, a discarded process is sometimes integrated with the structure of a firm that is operating at some other vertical level; or, it may be undertaken by a new set of entrepreneurs. In still other cases, a discarded process may have become obsolete.

The set of processes under specific consideration here are related vertically by virtue of their contribution to the value of a single final consumer product. These processes are utilized in production to differentiate a product in succession so that it is transformed from basic raw material to its final consumer form. Essentially, the output of one process becomes an important input to the next in succession; and, certainly, the products at a second stage are in some respects different from those at the first stage. For these reasons they are referred to as *successive differentiating processes.*

The theory of vertical structures centers about the decisions of a firm to include or exclude vertically related differentiating processes within the scope of its activities. The firm is viewed as a single organized behavioral system whose production possibilities are defined by a production function. And in order to describe possible variation in the vertical

dimension, it is necessary to conceptualize a structural component of the firm's production function that lends itself to vertical as well as horizontal manipulation in analysis.

The dimensions of products

The conceptual clue to the nature of the structural components lies in a two-dimensional view of a set of homogeneous products at the consumer level. At this level, each unit of product contains all of the properties or characteristics that have been imparted by the producing and

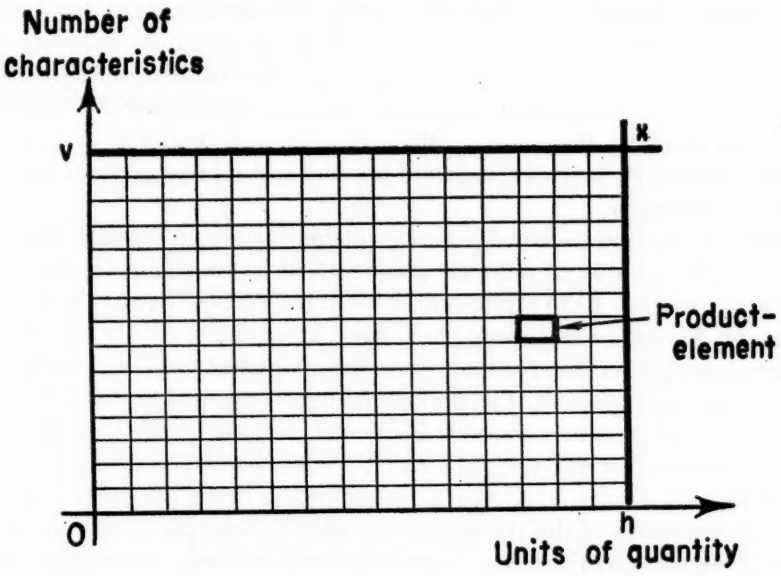


FIGURE I. A DIAGRAMMATIC VIEW OF A TOTAL PRODUCT-GRID, DELINEATED TO SHOW THE CONCEPT OF THE PRODUCT-ELEMENT.

marketing sector. The term "characteristic," however, takes on a specific meaning in the theory of vertical structures. From the view of the consumer, it is *a property that is variable in demand and imparts to the product some significant utility of form, time, or space.* From the view of the producing sector, a *characteristic represents the least meaningful change in a product brought about by the completion of an act of production.* With this concept, the two dimensions of any homogeneous output can be defined—the vertical dimension, in terms of the number of characteristics; the horizontal dimension in the conventional terms of units of product.

The concept of a product in two dimensions is highly simplified by the pictorial view in figure I. The area of the rectangle, *ovxh*, represents a homogeneous set of products at retail as determined by the aggregate

consumer demand. The horizontal dimension, *oh,* describes the number of units of quantity in demand, as in conventional analysis. The vertical dimension, *ov,* indicates the number of characteristics demanded in each unit of product. For the producing sector, the area, *ovxh,* represents the total to be produced of a single product.

The unit area of the product-grid in figure I also has conceptual significance. Each of the small rectangles of the grid is one characteristic high and one unit of quantity wide; and it follows from the definition of a characteristic that these are the smallest meaningful components of a product. Thus, they are called *product-elements.* The elements in each row, across the entire product-grid, are by the assumption of homogeneity, perfect substitutes; those in each column are generally complements and each successive characteristic represents some value or utility added. The case of heterogeneous products can be represented by separate grids—as many as there are significantly different products in analysis. Within each grid, however, the final product is still homogeneous and the grid is rectangular.

Most of existing demand theory explains consumer reaction only in terms of the number of units of quantity; that is the change in the horizontal dimension of the product grid when the vertical dimension is held constant. There seems an important need however, to clarify the nature of consumer preference for more or fewer characteristics; i.e., changes in the vertical dimension of the grid. It is quite conceivable that for some products with extremely inelastic horizontal demand coefficients, the vertical demand relations are the more significant ones to consider. Food products are a case in point. In recent years, there has been a much greater expansion in the per capita demand for food characteristics (i.e., food services) than there has been for pounds of food. An example of a reduction in the vertical demand for product characteristics is illustrated by the "do-it-yourself" trend in some products; the characteristics imparted by the process of assembly are no longer in demand.

Some structural aggregates

By expressing each product-element as a function of inputs, the foregoing concept can be translated to yield the basic structural components of the aggregate production function of a firm. In this context, however, the term product-element is no longer appropriate and the more meaningful counterpart, *technical-element,* is used. The technical-elements are the building blocks of a firm's cost structure; the deviation from simple additivity when these are aggregated by a firm is the problem of integration.

The problem of the firm is to aggregate and organize a set of technical-elements in a manner that is optimal with respect to its goals, and to

build a total structure that can withstand the pressures of competition. A firm may aggregate technical-elements in both the horizontal and the vertical direction. It cannot however, extend beyond the horizontal and vertical bounds of the total grid for the product for that is the extent of the market. But, the market is not the only restraint to scale. As the scale of operation increases in either or both directions, the firm will encounter increasing costs. Thus, when the grid is extremely large relative to the firm's capacity, a number of firms will compete for position on the grid as is demonstrated in figure II. The subscripted capital letters, *A* . . . *D*, each indicates a firm. The smallest of the rectangles in figure II represent the technical-elements. A row of technical-elements within the

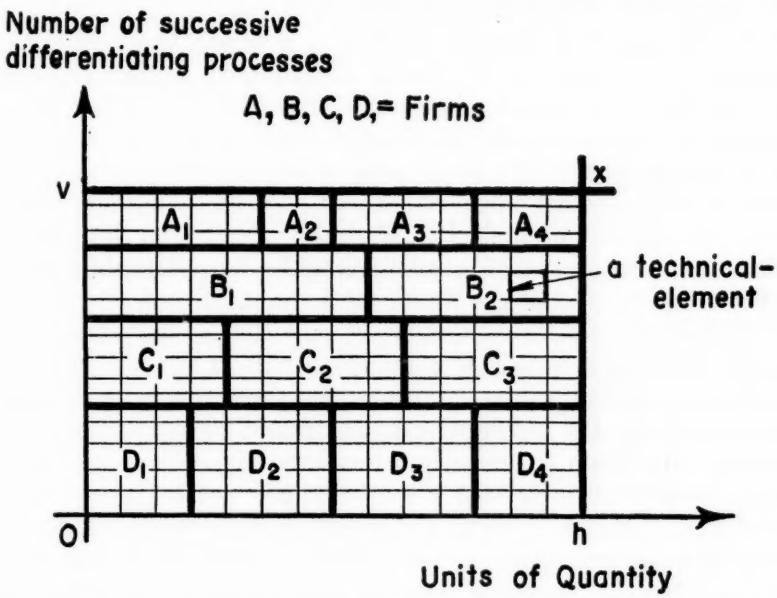


FIGURE II. A DIAGRAMMATIC VIEW OF A TOTAL TECHNICAL-GRID, DELINEATED TO SHOW: (A) THE TECHNICAL-ELEMENTS, (B) THE STRUCTURE OF FIRMS, (C) THE INDUSTRY-CLUSTER OF FIRMS.

boundaries of a firm represents a single successive differentiating process in its operation; it is a horizontal aggregate of technical-elements. The inclusion of several rows within a firm's structure implies the vertical integration of several such processes.

Two additional structures can also be recognized in figure II. The firms at any one level, such as $D_1 \ldots D_4$, constitute the usual concept of an industry-group. Their relations within this group are essentially competitive. The entire group of firms on the grid, *Ovxh*, is termed an *industry-cluster*, and the relationship between vertically adjacent firms is both negotiative and competitive.

Vertical integration in perspective

It follows from the foregoing concepts that the problem of vertical integration is a part of the general problem of how and what to produce. It focusses upon the vertical *extent of control* that entrepreneurs exercise in producing some sub-area of the product grid. But clearly, the problem cannot be analyzed in the absence of horizontal considerations. Organizational control extends in two directions. A firm, for example, may choose to sacrifice vertical control for horizontal. This is the case of adjusting its structure toward *entrepreneurial specialization*. The reverse adjustment is also a possible choice and represents the case of *vertical integration*.

The *degree of control*, too, can vary. In a capitalistic economy, the right to full control of internal decisions is generally acquired through ownership and contract in the hiring of productive factors. But sometimes the degree of control takes a weaker form as when the scope of ownership or contractual rights extends only to a portion of the decisions in the production of a set of product-elements. The weakest forms of control may represent only a conditional claim to ownership, as in the case of the extension of credit to a vertically related firm. But these are border cases, because control may be averted by the debtor through payment of a rate of interest compatible with the risk to the lender. However, lending rates tend to be uniform by custom. And when the amount of credit extended is beyond that considered safe at the customary rate, some direct or indirect managerial control may be exercised by the lender to compensate for the additional risk not covered by the premium.

Vertical integration is primarily a means to ends. When it is accomplished through full ownership it may represent nothing more than an alternative to horizontal growth. The specific ends, however, may be difficult to detect in real situations; thus, all the possibilities of gain or loss must be explored. These may arise in production, in marketing or in capital and resource acquisition. Also, the nature of risk and uncertainty is likely to be different from that existing in the pre-integrated structure. The weaker forms of vertical integration are generally more selective in purpose. They are commonly directed to specific external problem areas that have hindered the firm in reaching its over-all objectives. In general, the fullest degree of integration will accomplish anything that can be achieved by one of the weaker forms. However, the latter have the advantage of being specific and also they permit a firm to extend its control and influence over a wider area of the technical-grid than is possible through ownership.

An elementary model

A model of the firm which incorporates the forces relevant to decision making with respect to its vertical structure is placed in the spectrum of

long-run planning. Decisions to integrate vertically usually involve the addition of some capital items that become fixed in the short run; alternatively, decisions to specialize vertically require time for the depletion or write-off of fixed capital. The model is therefore viewed in the long run when all inputs are considered variable by a given decision making unit.

The basic parameters of a two-dimensional planning system of a firm are determined by the existing level of technology and by the ability and capacity of the managerial unit to employ it. In a long-run dynamic context both of these factors are variable. But in a realistic planning sense, both are static at the time the plans of a firm are initiated. This is the

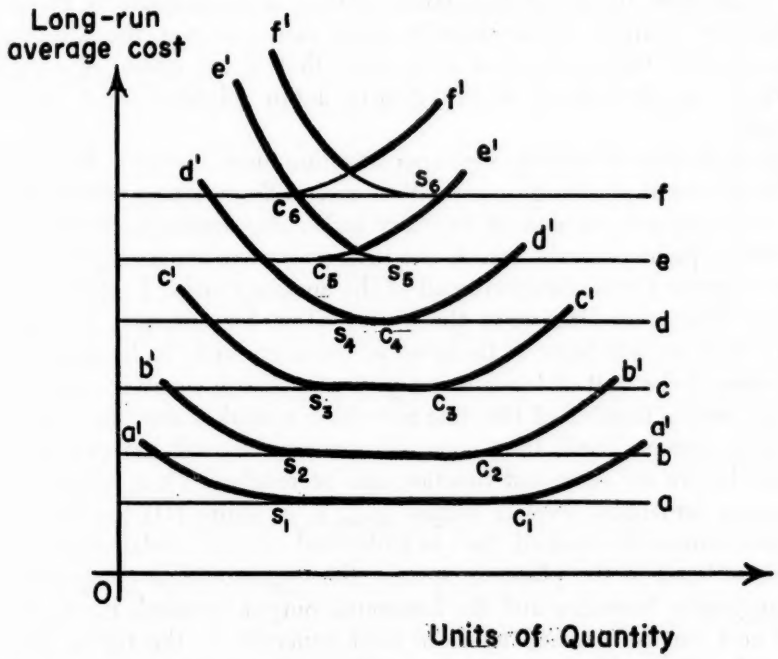


FIGURE III. THE LONG-RUN PLANNING-SYSTEM FOR A FIRM SHOWING ALTERNATIVE VERTICAL AND HORIZONTAL STRUCTURAL COMBINATIONS.

crucial moment in decision making; and, the one relevant to structural decisions. Thus, management is assumed to be fixed.

The elementary model in figure III describes the vertical and horizontal structural possibilities for a firm under full ownership. It is assumed that all vertical adjustments are harmonious; that is, the entire output of one process is differentiated by a subsequent process within the firm. The long-run planning system so described is in terms of average costs; and, factor prices are held constant.

The technological base of a two-dimensional long-run average cost

structure of the firm is represented by a cumulative vertical series of constant average cost functions (figure III). The constant function, *a*, represents the *lowest* average cost at which the first process in succession can be operated. The function, *b*, represents the cumulative *lowest* average cost of operating the first and second stage together. The functions *c* . . . *f* are defined in a similar way. The constancy of each function is justified on the basis that a horizontal aggregation of any set of technical-elements is a repetitive process and should ideally be subject to constant cost if the managerial restraints are ignored. The difference between each pair of adjacent constant cost functions represents the lowest average cost of adding the particular product characteristic. In the simplest, but probably the rarest case, the set of least-cost functions is determined by ordinary cumulative addition. In the more frequent case, however, the addition is influenced by the existence of joint costs; that is, the effects of complementary, supplementary, or antagonistic input relations must be considered.

The principles of intra-process specialization must, however, be applied to the technical planning system. With each differentiating process there are an associated number of ancillary tasks: maintenance, cleaning, accounting, quality control, etc. A one man operation, for example, cannot achieve perfect specialization in all of the ancillary tasks. To gain perfect intra-process specialization in the use of labor, for example, at least as many workers will have to be hired as there are tasks to be done. Furthermore, if the unit of labor is not perfectly divisible and if some tasks require only a fraction of the time for which a worker must be hired for the main process itself, then even a larger number will have to be employed before the least-cost function can be reached. Thus, below some minimum horizontal level of output (e.g., s_1 in figure III) the least-cost function cannot be reached. And as additional vertically related processes are considered in the planning system, the organizational complexity of the aggregate increases and the horizontal output at which the relevant least cost can be reached tends to drift generally to the right. This is shown by the points $s_1 \ldots s_6$ in figure III.

A firm's structural possibilities are also confined within the capacity of the managerial talent that it is able and willing to acquire. The ability to hire managerial talent is limited by the supply. The willingness to acquire it is dependent upon the psychological and institutional frame-work within which the entrepreneurs operate. In most cases, the limit to scale imposed by the capacity of the management group is quite real—problems of co-ordinating production activities increase with scale. In some instances, the limit may be partly illusory, especially when the attitude toward risks and uncertainty is pessimistic. In any event, for each least-cost function there exists some horizontal output beyond which the long-

run average cost will or is thought to rise. And, for the entire planning system, the output at which average costs rise from the successive least-cost functions will occur at a lower and lower horizontal scale with each vertical addition—every addition increases the coordination problem. The points from which increasing costs occur are shown by the letters $c_1 \ldots c_6$ (figure III).

In sum, the effective long-run cost functions that represent the complete planning system are shown by the set of curves $a'a' \ldots f'f'$ (figure III). As more and more successive differentiating processes are considered in the planning system, the horizontal range of output over which the relevant least cost can be reached narrows progressively. At the vertical level $e'e'$ the effective long-run cost function rises *before* the full gains from intra-process specialization are realized. Thus, increasing costs arise when vertical integration is carried beyond a certain level. Under competitive pressure, a firm operating above $d'd'$ could be forced to fragment its structure; or alternately, to expand its managerial capacity so that the points $c_1 \ldots c_6$ and the rising portions of the cost curves shift to the right.

The foregoing model introduces explicitly the cost factors relevant to the determination of the vertical dimension of a firm's structure. The optimal structure of the firm can now be determined by introducing the relevant demand parameters at each of the respective vertical stages. The actual structure however, is dependent upon the firm's ability to concentrate the necessary resources. A firm without sufficient resources may have to choose a lower level of vertical integration. Under perfect competition any of the structural possibilities within the rough triangle $s_1s_4(c_4)c_1$ may be stable providing it meets the minimal income requirements of the entrepreneur.

This is about all that can be concluded from the over-simplified elementary model. It can however, be extended to involve the more complex cases that have been assumed away. Time unfortunately does not permit a further exploration. Nevertheless, the elementary model has been developed sufficiently to provide a conceptual guide for a brief and general analysis of the case of hog production.

An Application to Hog Production

The rash of so called integration activity that has recently crept into hog production is the focal point of the remainder of this paper. The intent is to show that these activities are indicative of two major interrelated developments. These are: (1) the corn-hog combination is becoming increasingly unstable as an operational structure and thus hog production is likely to become separated from corn production; and (2) the feed-manufacturers are not yet firmly entrenched as members of the hog industry-cluster and therefore are engaged in intensive product promotion

and some weak forms of integration to achieve this goal. Both of these developments are a continuation of the specialization trend that has been dominant in agribusiness history. Feed manufacturing is in an advanced stage of this trend; hog production appears to be at the uncertain brink of transition.

The existing corn-hog structure

The corn-hog combination is the typical and dominant source of market hogs at the present time. In general, these structures are harmonious because virtually all of the corn that is produced is fed to hogs on the same farm. The managerial capacity pertaining to each unit is fixed by the accepted institution of the family farm. Thus the assumptions of the basic model are essentially satisfied.

The corn-hog structure is viewed not as consisting of only two distinct differentiating processes, but rather as a series of vertically related process components. For expositional and analytical simplicity, however, only three important subsets need to be defined because the evidence points to a weakening linkage only between corn growing and feeder-pig production and between the latter and the growing-fattening operation.

Considering the technological and biological complexity of these three subsets, it is clear that an essentially one-worker-manager unit cannot hope to achieve the full gains possible from intra-process specialization in each. A sufficient enlargement of the managerial unit might permit complete intra-process specialization of the corn-hog operation. But, the institution of the family farm strongly resists such a notion. Thus, with a self-imposed limit on management, it is almost obvious that the technical least-cost function of the corn-hog aggregate cannot be reached; costs will rise before the full gains from specialization are realized. (The situation resembles an average cost function such as $f'f'$ in figure III.)

The corn-hog structure has, however, persisted because of the strong complementarity that traditionally has been obtainable through the joint operation. This complementarity had particular relevance to the utilization of seasonal labor; to some degree to the disposal of otherwise unmarketable corn; and, at the other end, to the disposal of manure. Another factor in the traditional stability of the corn-hog structure is the problem of disease control as it relates to the scale of hog-production. There is a general belief that the incidence and risk of endemic diseases increases at a rate more than proportional to the size of the hog operation. Thus, in the presence of these forces, little competitive pressure was brought to bear upon the corn-hog structure. Few entrepreneurs in the past were able to visualize a sufficient level of income from hogs alone, and the possible gains from specialization did not offset the advantages of input complementarity.

The future structure of the hog-producing firm

But new technology is destroying the factors that created the advantage for the corn-hog complex. The advent of multiple-farrowing techniques is changing hog production from a part-time to a full-time endeavor; its labor and management requirements can no longer be drawn adequately from off seasons in corn production. The multiple-farrowing technique is likely to spread rapidly. It has a particular advantage to the early innovator through higher seasonal prices, and the average cost of some fixed inputs may be lower than for the sporadic twice-a-year case.

The risk of disease loss, too, is being reduced. There is an increasing awareness that proper management systems are a part of the answer: antibiotics are preventing the outbreak of some diseases; and, something like the notion of the disease-free pig by hysterectomy may bring the final answer. There are good reasons for optimism. One is a general faith in the results of research, another is that an increasing amount of private capital is being directed to the quest of a solution to the management and disease problems that have plagued hog production. Much of the art of pig husbandry is being replaced by scientifically founded decision rules.

There are, of course, a few large, specialized hog operations in existence today. Those in the midwest are quite new in time and in mode of operation. The entrepreneurs are hiring highly trained managers, the scale of operation is sufficiently large to keep a veterinarian on retainer, accountants analyze the operation to determine its profitability, and the advice of feed-specialists is used. In sum, intra-process specialization is carried to a high degree. The risks are, of course, high—mainly because managerial experience with large-scale undertakings is limited. But confidence also runs high. Some of these operators visualize enterprises that will eventually yield up to 50 or 100 thousand market hogs per year.

This is the prototype of the unit that is visualized to force an ultimate separation of hogs from the corn farm. Large-scale units will be able to achieve internal specialization with respect to the ancillary functions associated with the processes in hog production. By this, they will be able to approach nearer to the least-cost function than the family operated hog-corn structure. This will be very important when the latter's advantages through complementarity are lost.

Apart from the technological problems, there will be the problem of resource concentration. Capital will be needed in extremely large amounts compared to the present. To acquire this, hog producers may have to integrate with, or form, separate corporate structures. Experienced management, too, will be in short supply. In sum, the development toward entrepreneurial specialization is likely to be slow.

There is also the important question of prices. The emergence of large-

scale operations is likely to contribute to a general increase in pork output, because the new structure is usually added before the old is released. With demand moving at the normal rate, the resulting cost-price squeeze will reduce the margin to all residual claimants. Thus, the continuation of the trend and the rate of adjustment will depend on the comparative acceptability of the reduced margin between the old and the new. It is contended that the margin per hog, to be acceptable, will have to be considerably larger for the small-volume corn-hog producer than for the large-volume specialized entrepreneur. The need for additional income by the corn producers cannot, however, be ignored. In the absence of alternative sources, he may accept an extremely low rate of return from hogs, at least until he can compensate the loss in vertical size by an offsetting increase in his corn operation, or until he can find part-time employment in some other enterprise on or off the farm.

The separation of hogs from corn production does not imply that hogs must leave the Corn-belt. This depends on the relative weight of locational forces, particularly the cost of transporting corn and the present location of packing plants. A fair guess might be that hog production will tend to concentrate around the existing decentralized packing-house locations. Who will produce the hogs is mainly a non-economic question. The producers could be opportunists from any walk of life, mainly those who possess or have access to the necessary capital and managerial talent.

Transitional structures

In the period of transition many trial and error structures are likely to appear. Particular interest is likely to be shown by adjacent members of the pork industry-cluster—namely, the feed manufacturer and the packer. These firms have a direct interest in the way hogs are produced since any important concentration in hog production is likely to reduce the costs of operating in their respective markets. To some degree they are also interested in the quality aspects of hog production. To the packer, quality means improved dressing percentage, and less low-priced product; he also visualizes the potential of differentiating pork in the consumer market for his own benefit. To the feed manufacturer, the quality hog is synonymous with feeding efficiency, a trait which makes his feed appear better to the hog producer. If producers in general are too slow in moving in this direction, these firms may take an important initiative. Such initiative will probably be exercised through some of the weaker forms of vertical integration. And it will not be too difficult to do, since they are emerging as important suppliers of technology and capital.

Some feed dealers who are situated at the fringe of the Corn-belt come closest to complete ownership integration of hog production. Their vol-

ume of feed sales is so restricted, spatially, that they have an excess of managerial and financial capacity to divert in some other direction. Logically, this is toward hog production. They have access to the latest technology and perhaps an occasional pecuniary advantage in feed purchases. But such vertically integrated structures, too, may fall under the pressure of specialization. In fact, there is already a tendency for some feed dealers to specialize by engaging only in the growing-fattening operation and to depend on the feeder-pig market for their supply of this input. (Some corn producers are, of course, doing the same thing.)

In the initial period of transition, there may be some relative increase in the sale of feeder-pigs. In other words, specialization may go only part way to a temporary split between feeder-pig production and the growing-fattening operation. But it is questionable whether the seasonal production of feeder-pigs without quality control can satisfy a market that is rapidly becoming conscious of the advantages of quality in breeding and year-round production. Widespread separation of the breeding and fattening operations is likely to occur only if there is a re-emergence of some modified version of the pig-hatchery.

The position of the feed manufacturer

The present market behavior of feed manufacturers reflects their attempts to become firmly entrenched across the entire pork product-grid as feed preparation specialists rather than as integrators of hog production. They have already established their position on those grids that pertain to the production of poultry and poultry products. They are now concentrating their efforts on the hog-feed market—their apparent next best alternative.

There are still many hog producers who do not as yet use the services and products that the feed manufacturer has to offer. The manufacturer would, of course, prefer to move into the product-grid with a complete feed. But some of the product-elements of a complete feed can probably be produced more efficiently on the farm where corn and hogs are produced. Corn makes up a large portion of hog feed and the corn-hog structure has the advantage over the manufacturer with virtually no inter-process transportation costs. Also, small-scale home mixing equipment can mix corn with pre-mixes or protein supplements with comparable efficiency. This is apparently not so with regard to the manufacture of pre-mixes; the essential microingredients cannot be mixed thoroughly with home equipment. Thus, in the hog industry-cluster, it appears that the job of the feed manufacturer may be relegated to the manufacture of pre-mixes and protein supplements as long as the corn-hog combination persists. But if hog production becomes specialized, so that corn has

to be moved significantly before it is fed, the feed manufacturer may be able to carve a larger niche for himself on the product-grid and sell a complete hog-feed.

The recent occurrences of so-called integrating behavior have mainly represented attempts to create an expanded monopolistically competitive market for hog feed. Historically, branding and product innovation have not been very effective. Feed formulae are easily copied and any initial advantage to the innovator is soon lost. Furthermore, firms have found difficulty in demonstrating to producers the profitability of good feeding because it is so highly correlated with husbandry and breeding, both of which are deficient on many farms.

To circumvent partially the problem of market-share and total-market expansion, feed manufacturers included with feed an advisory service and convenient credit. The lending of improved breeding stock was merely a more direct application of credit. But it is precisely this type of activity that borders on the weaker forms of integration especially when it is formalized by a legal contract. When credit is extended beyond the *safe limit* and when breeding stock is on loan or rent, it is easy to turn an advisory service to a subtle form of control. The line between advice, influence, and partial control is extremely fine.

The mediocre hog producer has been the likeliest candidate for contractual operations. He is a man with some interest in hog production, but one who has not acquired the lastest techniques nor the necessary managerial skills for a successful operation. As a result, he has probably also suffered the problem of capital acquisition. The contract offers him the opportunity to make up for these deficiencies and is therefore quite attractive to him. But this attraction may be temporary. In time, these producers learn the essentials of efficient production and their dependence on the feed manufacturer is reduced. There is no doubt, however, that credit and advisory services will continue to be used by feed manufacturers as methods in non-price competition. It is difficult to withdraw them in a competitive market.

Conclusions

In conclusion, there are two important trends on the horizon of the hog product-grid. A solution to the problem of large scale appears imminent, and hog production is likely to become separated from corn production. The vertical integration of hog production with feed manufacturing, if it occurs at all, is likely to be weak and transitional until the problems of resource concentration can be handled by the new entrepreneurs of the hog-producing industry. Secondly, the promotional activities of feed manufacturers are likely to continue to intensify and

perhaps border on some weak forms of integration, at least until the potential market for hog feed is exhausted. This behavior, however, is not dependent on the trend toward specialization in hog production, though it will most likely be affected by it. On the other hand, the rate at which feed manufacturers develop and spread new technology and aid in financing will influence the rate at which the structure of hog production changes.

DISCUSSION: INTEGRATION IN THEORY WITH AN APPLICATION TO HOGS

FRANK H. MAIER
Agricultural Research Service, USDA

There is much valid and useful theoretical content in Mr. Blaich's paper. I shall begin my discussion by commenting on the second and third parts of the paper, the parts entitled "An Elementary Model" and "An Application to Hog Production," and will then proceed to raise several questions about the first part, entitled "Vertical Structural Theory of the Firm."

The second part of the paper, "An Elementary Model," is a useful theoretical exposition of the extent of vertical integration that is optimum for a particular firm. Mr. Blaich argues that such an optimum point or range exists because as a firm increases the number of stages of production in which it is engaged, it eventually exceeds the capacity of its management and therefore experiences increasing average costs. Conceivably, as a firm expands vertically it might for a while ease the strain on its management by reducing its operations horizontally, i.e. producing a smaller volume of output of its final product. But horizontal output can be reduced only so far, Mr. Blaich points out, before the under-utilization of overhead factors of production begins to cause average costs to increase.

The third part of the paper, "An Application to Hog Production," speculates about the future changes that are likely in the organization of pork production. Mr. Blaich forecasts the demise of the prevailing corn-hog type of farm. He looks for a considerable increase in horizontal specialization, with some farms specializing in feed production and others in hog raising. He expects this development because he believes that introduction of new technology is having two effects. First, it is terminating the advantage that the corn-hog type of farm formerly enjoyed in the matter of input-complementarity. Second, new technology is reducing some of the old disadvantages of specialized hog-feeding farms. He considers it

obvious that gains in efficiency are overwhelming when individual large firms each specialize in one or the other of the two main stages of pork production—growing the feed and raising the hogs. Mr. Blaich may well be correct in this matter, but some relevant empirical comparisons would be welcome. By way of qualification, however, Mr. Blaich mentions the situation of corn producers who want additional income and have available farm labor but are unable to expand horizontally. Apparently, this is to suggest that the dominance of horizontal specialization will come about gradually, with some farmers persisting in the corn-hog combination for many years to come.

As to the kind of specialized hog-producing firms that will dominate the future, Mr. Blaich apparently expects little vertical integration between the feed industry and hog producers, except perhaps as transitional measures. The theoretical basis for this forecast is not altogether clear, but probably he feels that some of the gains from large scale horizontal specialization in hog production would be dissipated if accompanied by vertical integration between the feed industry and hog-fattening farms.

Finally, we turn to the first part of Mr. Blaich's paper, "Vertical Structural Theory of the Firm." My general reaction to this part is that it is not sufficiently oriented to a particular problem. To a lesser degree, this criticism applies to the other parts of the paper as well. In this matter Mr. Blaich may have been a victim of the way in which the subjects of this session were given out. In any case, vagueness as to the purpose for which a theoretical analysis is intended may have unfortunate consequences for writer and reader alike.

Perhaps the easiest way to show the drift of this criticism is for me to reveal my own preconceptions of the purpose and use of theory. As I view it, economic theory is used to help us think about particular problems. These may be either highly practical questions or they may have no immediate purpose but mere intellectual curiosity about cause and effect. For each individual problem we construct an abstract model, doing so either explicitly or implicitly. Certain elements, factors, or variables, are put into the model, selected on the basis of the relevance and importance for the problem at hand. In deciding how to relate these variables to each other, we are aided by the accumulated fund of various and diverse notions, the aggregate of which we call economic theory. For any particular problem the difficulty is to select the particular notions about variables and about relationships between variables that appear relevant.

The ultimate and indisputable test of a theoretical model is, of course, whether its prediction is validated by reality. As a practical matter, however, much of the time we must necessarily construct our models and make decisions from them without yet, or indeed ever, being able to check

them against reality. Hence, the ultimate test of a theory—whether it leads to valid prediction—is not available to us when we decide what considerations to include in an analysis. In making this decision, we can only (1) note whether the inclusion or omission of a variable alters the outcome of the model for our problem, (2) rely on our knowledge of the particular real-world problem to suggest the relative importance of cause-effect relationships, and (3) benefit from our experience with constructing theoretical models for other similar problems. No wonder, therefore, that the judgments we make in plying our craft may often seem as much like those of artists as of scientists.

If the purpose of a theoretical analysis is not clearly indicated at the outset of the discussion, the reader's task is unnecessarily frustrating. While following a theoretical discussion, a technical reader wants to evaluate whether the variables of the model and the assumed relations between these variables appear to be adequate for the problem to which the model is relevant. After reading the entirety of Mr. Blaich's paper, one can, of course, infer that he had implicitly in mind problems such as how far vertical integration is likely to spread in the production of a particular retail food item or what considerations an entrepreneur should recognize in deciding how far to integrate vertically and how far to specialize horizontally. But why make a reader guess about the purpose toward which the analysis is directed?

More important, however, the lack of clear orientation to a particular problem may also cause difficulty for the one who constructs the theoretical analysis. Two questions may be asked about the first part of Mr. Blaich's paper.

Does the analysis culminating in figures 1 and 2 need to be as elaborate as it is, considering the use made of the analysis? Perhaps my inference about the intended application of this theoretical analysis is incorrect. If so, this comment is irrelevant. But it seems to me that what Mr. Blaich's conceptual framework of the vertical structure of firms comes to is the simple idea of steps, or stages, or processes in the long sequence of production from raw inputs to finished retail products. Apparently, the only use he makes of the analysis is to indicate that an entrepreneur may enlarge his scale of operations either by integrating vertically or by specializing horizontally and that an entrepreneur needs to make a decision in this matter. The validity and usefulness of the idea of stages or processes in the sequence of production are not questioned. But when an analysis is elaborated in ways that are not relevant for the problem at hand, such elaboration tends to obscure the core of the argument.

The other question about the theoretical analysis consummating in figures 1 and 2 concerns the internal logic of the analysis. What are the units of measure of valuation for the vertical axes of both figures? In Mr.

Blaich's exposition, rectangular areas are referred to in both figures, although no use is made explicitly of such areas. If these areas are to have any meaning, then the units along the y axis must be more than numbers of unlike things. Conceptually, at least, there must be a meaningful unit of value. In figure 1, the units along the y axis are "characteristics," and a characteristic is defined as "the least meaningful change in production brought about by the completion of an act of production." Thus, each stage or process represents the same vertical distance as any other stage, regardless of differences between the stages in value added or cost incurred. The situation is essentially similar for the y axis of figure 2, which refers to the number of processes or stages in the sequence of production.

It would be possible to define the units of measurement along the y axes of figures 1 and 2 in such a way that the rectangles would have meaningful areas and that the areas of these rectangles would be useful for certain aspects of the theory of the firm. This is probably what Mr. Blaich implicitly had in mind. Figures 1 and 2 may be redrawn with their y axes expressed in terms either of "dollars of value added in production" or of "dollars of cost incurred in production."

Let me indicate briefly two ways in which this revision would be useful. For the first of these, consider a product grid similar to Mr. Blaich's figure 2, showing firms with different degrees of vertical and horizontal integration but having the y axis expressed in dollars of cost incurred. The area of a rectangle associated with a particular firm now represents the costs of completing the specified sequence of processes of production for the number of units of products indicated. The revised figure 2 can now be used to indicate the optimum organization of an industry with reference to the vertical integration and horizontal specialization of all the various firms in Mr. Blaich's industry cluster. The optimum structuring of the industry cluster is that which, among all possible structural arrangements, yields the final product at the least retail price.

A second application of my revision of Mr. Blaich's figure 2 relates to a particular firm's profit position. It would be possible to work with pairs of product-grids, the figures being otherwise comparable except that the y axis of one is expressed in "dollars of value added" and that of the other in "dollars of cost incurred." The "profit area" associated with a particular firm would be revealed by comparing its "value-added area" with its "cost-incurred area."

In closing, I should like to compliment Mr. Blaich for giving attention to and advancing a partially neglected aspect of the theory of the firm.

THE MIDWEST-EASTERN SEABOARD CONFLICT OF INTEREST IN THE PRODUCTION AND DISTRIBUTION OF MILK

CHAIRMAN: WILLIAM C. WELDEN, H. P. HOOD & SONS, BOSTON

THE COMPARATIVE ADVANTAGE ASPECTS

CHARLES E. FRENCH AND EARL W. KEHRBERG
Purdue University

Introduction

THE INTENT of this paper is provocation, not prescription. This area of economics spawns a broad range of questions; to classify and discuss these in such a manner as to provoke research for their solution seems a worthy goal. This paper will not survey broadly the alternative research approaches (7, pp. 13-86; 20 and 24),* nor will it review thoroughly the literature of specific studies (1, 2, 5, 7, 13, 15, 17, 18, 19 and 25). Rather it will try to put this topic in a deceivingly simple theoretical framework, attempt to pull together around this framework certain current thinking, and conclude with a delineation of some relevant hypotheses.

Theoretical Framework

"Interregional competition" is a term that connotates adjustment. Such adjustment comes in production patterns among and within regions because of the shifting equilibrium of supply and demand relations. Generally this competition refers to situations where different regions contend for a common market for a single product or a closely related group of products. However, as demonstrated by a number of interregional studies based on linear programming and spatial equilibrium models (2, 12, 14, 16 and 23), different regions may divide their product among various consuming centers and are interrelated even when the product of any two regions does not appear on the same market. Of course, it may be argued that the entire economy is just one equilibrium system and that every economic activity is interrelated with every other. In this sense the methodological problem of aggregation is always relative. In analyzing interregional competition involving specific products, a partial equilibrium system with certain factors or variables in the economy assumed constant is usually the most realistic approach. Yet, problems of aggregation loom large in interregional analysis.

In such a study the principle of comparative advantage is generally in-

* Numbers in parentheses refer to the literature citations, appended to this paper.

volved. Each of several regions may possess various resources which may differ from those of other regions in kind or amount and hence are suited to the production of different products. If these resources are immobile, a tendency to specialize in different products or combinations of products exists. Specialization in combinations of products rather than in single products is accentuated when the products are complementary or supplementary. The law of variable proportions or diminishing returns also suggests that if certain factors are present in fixed amounts (generally immobile factors) and other factors are added to these in production, at some level of input the marginal increment to the variable factors decreases. Hence, the textbook optimun combination of products and levels of output states that these marginal increments be equated among the regions and among products. Hence complete specialization is not expected. Regions not endowed with superior resources may have as high a marginal product at some relatively low level of input as the more advantaged region has when operating more intensively. Thus we have an explanation of the difference in intensity of production and combination of products that are found in different regions based on certain production conditions alone. Changes in these relationships because of discovery or new technology and/or resources can lead to adjustment problems recognized as interregional competition.

Comparative advantage principles based upon differences in resources, their immobilities, and production relationships are not enough to explain fully interregional trade, location of production, and competitive situations. Such an analysis ignores a number of important variables. One of these recently given considerable attention is that of transfer costs, which has led to development of location theory. Von Thunen's contribution is a classic in this area but extensions and refinements have taken place until today a number of variations of mathematical programming, illustrated in the references cited, are used to facilitate analysis when this factor is considered.

In its simplest form the concept of transfer cost involves the differential costs of products and/or factors resulting from difference in the distance shipped. Thus, producers near the consuming center or market are expected (other things equal) to receive a higher price for their product after paying transportation costs than more distant producers of the same product. Likewise the mobile factor prices will vary depending upon distance from the factor markets. Different intensities of production are expected as the factor-product price ratios vary from region to region. Necessity for adjustments in production are caused by changes in technologies of transportation and production.

The nature of the factors and products also has an impact upon the transportation costs. Bulkiness and perishability differences in com-

modities cause a shifting of the price ratios among the products and among the factors as the distance from the markets varies. Again different intensities of production tend to result.

Finally, to the transportation costs must be added costs of handling, packaging, inspection, storage at different points, etc. Many of the marketing and institutional factors that Dubov and Downen will discuss are intertwined into this bigger problem of transfer cost. Taken together with the differences in resources and immobility situations, transfer considerations broaden the picture to permit a more realistic analysis of interregional competition. The picture, however, still is not complete.

On the demand side, population and distribution changes mean shifts in location of consuming centers and in the relative demands of the various centers. The growth and sometimes the decline of consuming centers results in a need for adjustment in the production patterns because of the shifting equilibrium price. Various regions are led to produce more or less and the amount and share of the product placed on the various markets may change.

Technology as a shifter on the supply side has already been mentioned. It should be recognized, however, that the technology involved need not be that directly involved in the production of the product in question. It may be in the field of substitute products or in the area of factor and service production. Weather may also cause short-run fluctuations in supply of the product or of competing products or factors.

Historical production decisions affect comparative advantage and opportunity costs. If in the past, large investments have been made in relatively fixed equipment such as buildings, management training, etc., and if these factors are relatively immobile either because of physical problems of transport or lack of knowledge or emotional ties of the people, the result is the same as creating a situation in which there are immobile factors. That the regions were not directly endowed by nature with these factors is of little consequence. Once the investments are made they remain fixed unless their value in use drops below their salvage value (29). Under these conditions current production decisions are rationally made upon the basis of variable costs and inputs only. Since not all assets wear out at the same time, it is also profitable under certain conditions to continue to replace or repair and maintain such fixed investments if the additions alone can be paid for, since to make such additions may permit the best recovery from resources with a low opportunity cost. As a consequence, noticeable competition between areas may remain in effect for a long time while long-run adjustments are being made in such fixed factors. Even though new technologies and other shifts in equilibrium conditions give the advantage to one region or another from a planning viewpoint, this doesn't mean that these regions can immediately exploit

this advantage. Nor is this to be considered inefficiency in the working of our economic system, since to throw away previously committed resources to take advantage of more efficient methods is efficient only if the salvage value of the resources is less than their value in use.

One must keep in mind too that there are external economies involved and the regions which become established in production first often have this advantage. Their factor markets, product markets and transportation systems are established and may help perpetuate their advantage.

The Relevance of the Theory

The focus of this paper, then, is on adjustment. That we have had, and will continue to have, competition in milk production and consumption between the Eastern Seaboard and the Midwest is taken as given (4, 19 and 25). Relative issues are those giving rise to economic adjustments in the pertinent relationships. In this context, comparative advantage is considered broadly. This paper emphasizes some adjustment factors not always made explicit; however, it generally holds as relevant the same classification of relationships as have others such as Tolley and Hartman (24) or Rojko (1, pp. 44-45), who sketched them as:

1. Technological and behavior relations which show how individual farmers and firms behave in supplying goods to market and in using the various factors of production.
2. Relations which explain behavior of decision makers in households concerning demand for goods and services and in supplying labor.
3. Market clearing relations which equate supply and demand in each sector and in the whole industry.
4. Legal and institutional relations which impose certain conditions on technological and behavior relations.

The last of these relationships is reserved for the other paper in this discussion, but the first three probably encompass most of the relevant issues.

Liberty to focus on adjustment seems to be given without recourse today. Yet, we feel compelled to comment on our selection of such emphasis.

Unusual, and somewhat surprising, accolades have been bestowed upon the dairy production and marketing system because this system looks so much like the picture painted by the classical economist. Hassler (5) said of the manufacturing industry, "Although some persistent inconsistencies in price relationships of the manufactured dairy products industry were disclosed, much of the evidence suggested that the pricing mechanism was remarkably compatible with a competitive system." Snodgrass and French (2) tended to infer much this same general endorsement for the total industry. Historical patterns of resource use in dairy production are under question. However, French and Walz (8) give both the fluid bottling and manufacturing industries a rather favorable comparison with other

industries so far as rate of technological growth is concerned.

Despite what appear to be generally acceptable production and marketing patterns, studies such as those of Snodgrass and French (2) make one uncomfortable. They conclude in considering a wide range of conditions which might affect production and marketing patterns that ". . . general pattern changes of any magnitude were not noticeable. However, in each case and particularly in the export variation and the state milk control variation, the increase in aggregate cost was sizable." For example, they found that a transportation cost increase equivalent to a 5 percent increase in prices of milk in 16 of the 48 states resulted in an increase of 9.5 percent in the total transportation bill for the entire country. Similar evidence in other public research, and especially in some private operations research applications, suggests that a ripple of disequilibrium in our economic system can cost dearly in social adjustment before the water calms again. Dynamic theory that suggests continuous disequilibrium gives reason for concern, as do studies showing the range of market imperfections (6).

Opportunity cost looms large in any discussion of comparative advantage, especially in dairying. Baker (21) and others have called attention to this generally. It was dramatically illustrated by Snodgrass and French (2), who found a general production and trade pattern to persist through a wide range of condtions so long as transportation and/or processing costs were considered. However, with the inclusion of production costs for raw milk disregarding opportunity costs, Wisconsin and Minnesota produced virtually all manufactured products. Twenty-six of the states did not even produce milk for their own fluid consumption.

The opportunity cost aspects of the problem can be illustrated with conventional opportunity contours (Figure 1).

AA′ might be looked upon as representing both the Lake States and Eastern Seaboard dairy areas with their relative physical advantage in dairy production indicated by the nature of the contour.

In the Lake States and Eastern Seaboard, we do not in general have a highly fertile land area, that has production functions permitting higher levels of output for given levels of input, in one case and a less fertile area in the other. Furthermore the areas are not too different in latitude and rainfall. Thus, costs of production cannot be expected to differ greatly on the physical production function basis. Production functions for alternative crops, while differing greatly for specific farms both within and between areas, are probably somewhat similar for the types of farms having a relative advantage in dairy. Such farms have relatively large areas well suited to forage production and relatively small areas well suited to other grain crops.

Similarly *CC′* might be considered representative of the Corn Belt with

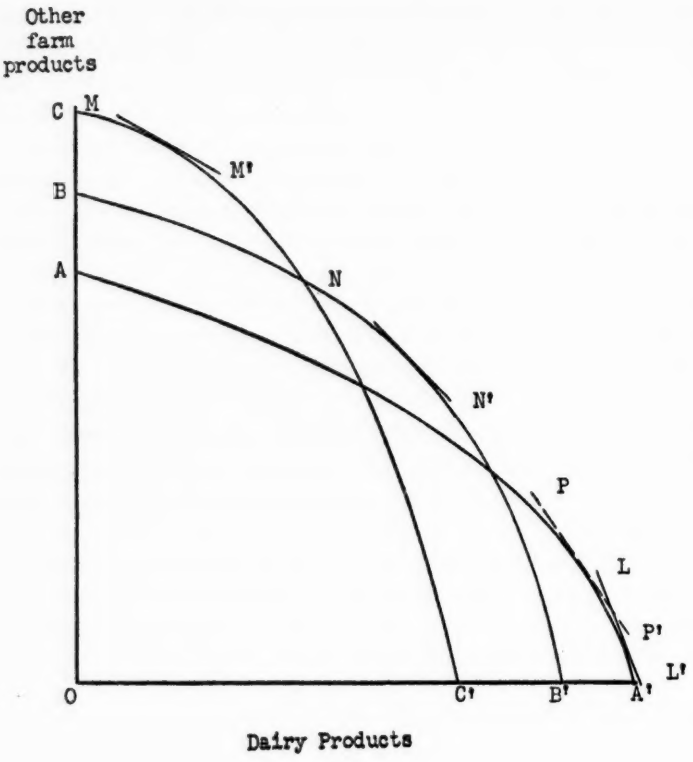


FIGURE 1.

its fertile soils well adapted to grain. The fact that these areas could also produce more dairy products than the hay belt might have been illustrated by moving the curve up and to the right beyond the other curves. Size of area is involved in such a situation, however. No attempt is made here to show relative position but rather to picture the nature of the curves. *BB'* more nearly represents the nature of production possibilities in the fringe area. The slopes of the short straight lines tangent to the opportunity contours as usual represent price ratios and here are pictured to show a price ratio advantage for dairy products in those areas having the greatest relative production advantage. *LL'* and *PP'* can be considered as representative of the difference between the Eastern Seaboard price situation and the Lake States price situation. Thus, if the production situation as pictured were exactly the same in these two areas, greater specialization would occur in the East. Apparently higher production per cow, more cows per farm and greater concentrated feed inputs per cow in the East are not inconsistent with this hypothesis. However, the most interesting implication of this construct appears in the nature of the fringe

area possibiliies. It is here that the real flexibility lies. One expects that the greater degree of specialization would appear in the Eastern and Lake State areas. And, while the necessity for competitive adjustments is most keenly felt here, the inability to make wide adjustments profitably necessitates greater adjustments elsewhere. Changes in price ratios are likely to have greatest impact on production in the fringe areas where alternative opportunities are more prevalent. Note that slight changes in the slope (price ratio) *NN'* means relatively wide shifts in output of dairy products. Of course, if *BB'* had a greater bow in it, proportion of products might be more stable under price change. It seems likely though that the fringe areas are those which can easily shift from one product to the other.

Since the contours may be looked upon as representing not only the general situation but also the individual farm conditions, a greater degree of specialization is expected in the eastern than in the western areas and fringe areas of the dairy belt.

TABLE 1. TOTAL NUMBER OF MILK COWS ON FARMS,[a] NUMBER OF COWS ON DAIRY FARMS,[a,b] AND PERCENTAGE OF COWS ON DAIRY FARMS IN NEW ENGLAND STATES, MIDDLE ATLANTIC STATES AND SELECTED MIDWESTERN STATES, 1954, 1950

Region	1954			1950		
	Total no. of milk cows on farms	No. of milk cows on dairy farms	Percent of milk cows on dairy farms	Total no. of milk cows	No. of milk cows on dairy farms	Percent of milk cows on dairy farms
Midwest						
Wisconsin	2,239,277	2,002,966	89	2,078,245	1,816,928	87
Michigan	796,635	529,591	66	799,890	501,114	63
Minnesota	1,366,189	722,424	53	1,366,241	617,937	45
Ohio	812,901	373,349	46	878,904	362,502	41
Missouri	802,846	354,475	44	927,782	315,453	34
Illinois	754,241	251,438	33	911,572	247,911	27
Indiana	587,416	162,242	28	656,337	161,200	24
Iowa	1,040,240	131,530	13	1,166,381	97,505	8
Middle Atlantic						
New Jersey	149,441	136,688	91	134,293	116,588	87
New York	1,305,808	1,194,521	91	1,253,460	1,118,678	89
Pennsylvania	888,621	696,429	78	852,960	640,204	75
New England						
Vermont	266,898	254,260	95	245,443	230,781	94
Rhode Island	13,562	12,635	93	14,757	12,573	85
Connecticut	102,118	89,880	88	102,538	87,058	85
Massachusetts	114,618	99,987	87	111,426	92,078	83
New Hampshire	59,205	48,947	83	60,141	46,776	78
Maine	110,593	77,803	70	102,665	63,121	61

[a] 1954 Census of Agriculture (based on a sample of farms).

[b] Dairy farms are those on which 50 percent or more of the value of all farm products sold were dairy products or on which (1) Milk and other dairy products accounted for 30 percent or more of total value of products sold, (2) Milk cows represented 50 percent or more of all cows, and (3) Sales of dairy products, together with sales of cattle and calves, amounted to 50 percent or more of the total value of farm products sold.

That the aggregate proportion of milk cows on dairy type farms in the Eastern Seaboard is higher than in the Midwest is, therefore, not surprising (Table 1).

The tendency for capital investment to be in specialized forms of a relatively fixed nature tends to accentuate the above relations. These assets can then act as a cushion of relatively immobile resources at some later date to retard adjustment or retain advantage for an area in the face of shifting demand and supply conditions in general. In particular, specialization of dairying creates rigidity in the nature of a high fixed management cost. Management skill of modern specialized dairying is costly and deters shifting dairy production between any two areas. These rigidities even on diversified, fringe-area farms should not be overlooked. For example, Kranz found in the Fort Wayne, Indiana, area that more than half of 97 farmers studied said they never expected to move out of dairying except by death or retirement (26).

The question regarding alternative opportunities for dairymen in areas other than the two here considered is important. Snodgrass and French (2) conclude that the pressure for the Lake State areas tends to be to move products east. They place the current "continental divide" for milk as running through Minnesota, Iowa, Missouri, Arkansas and Louisiana. Generally, they see little to upset this for some time to come (Figure 2). They describe the optimum movement pattern of dairy production as:

Wisconsin exporting to the East and New England
Minnesota exporting to the West, South and Southeast
Iowa exporting to the South and Southeast
Kansas exporting to the South
Nebraska exporting to the Southwest

This suggests a pressure to move more milk from the Midwest to the West, South and Southwest. Dairying is expected to continue to expand in these now deficit areas, but in general, production increases in these areas will probably lag demand increases (27). This suggests a break in the solidarity of the traditional Midwest pressure on the Eastern Seaboard. Pressure to move product to the Seaboard from Wisconsin and some East North Central states will continue, but the West North Central states may be facing pressures to move product in other directions. The definition of Midwest in our title then becomes questionable.

Also, the much greater improvement in feed conversion ratios for nearly all other livestock and poultry enterprises relative to dairy may do much to see these other enterprises increase the opportunity costs for dairying in the traditional dairy and fringe areas (28). But let us redirect our attention to the Midwest and the Eastern Seaboard.

Transfer costs in dairying have been high for technical reasons. The current research mandate and general drive to alter these technical re-

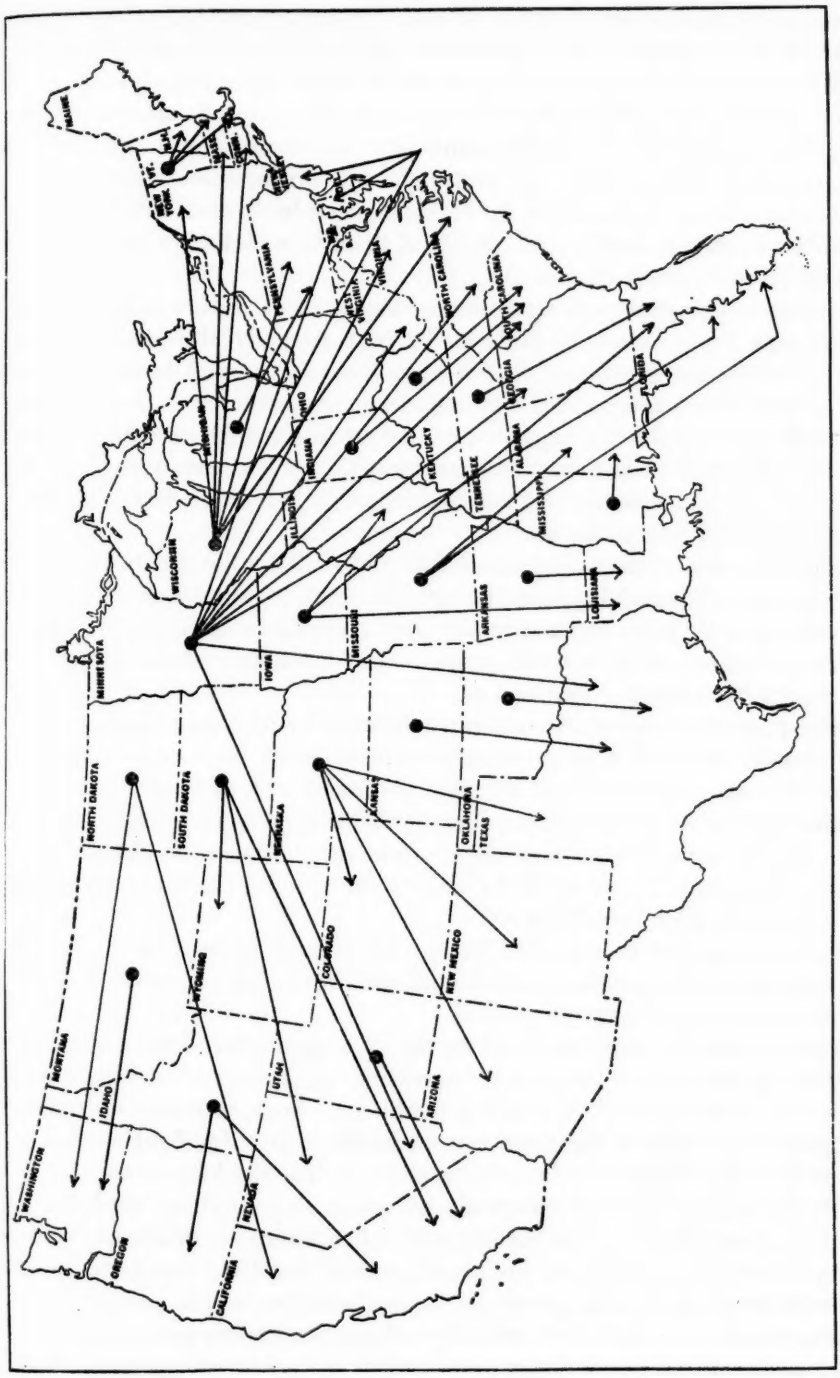


FIG. 2. OPTIMAL INTERSTATE FLOW PATTERN FOR THE AGGREGATE MILK MODEL TO MINIMIZE TRANSPORTATION COSTS, PURELY COMPETITIVE MODEL, 1953.

strictions in such characteristics as bulkiness and perishability will prevail. Water content of many products will be reduced, keeping quality will be continually improved, transportation concessions and savings with such facilities as piggy-back rail arrangements and toll roads will be granted, organizational arrangements and communications will foster inter-plant transfers, and legal restraints will be lessened. Adjustments created by these changes will be legion. Such adjustments will continue to lubricate the competitive advantage of the area with the lowest relative cost pattern (6, pp. 8-14, and 9).

Transfer costs may well figure more heavily in the future comparative advantage battle than they have in the past. Actually, the fact that the natural resources bundle conducive to milk production has been in close proximity to the concentrated population centers needing milk is probably in most part a child of happenstance. Yet, it fortunately gave us a relatively low transfer cost for dairy products (18). This may have in part directed attention on the transfer problem to other products with more urgent transfer cost problems.

Shifting populations may enlarge this part of the adjustment problem. Snodgrass and French (2) found geographic shifts in population projected for the next 10 years to have small effect on optimum aggregate movement patterns by conventional measures, but the transport bills were increased 4.1 percent per unit moved.

The growing number of short-run adjustment problems put emphasis on transfer costs. The seasonal surplus problem of fluid markets highlights this set of adjustments. Whitted (3) found milk of bottling quality to run 37 percent above fluid needs in 14 Midwest markets during 1950-57. The surplus varied widely from month to month, with surplus above fluid needs averaging 15 percent in the low month (October) and as high as 65 percent in the high month (May).

Shifts toward retail store distribution of fluid milk have called for large amounts of fluid supplies on week ends and have thus created a serious weekly surplus problem.

These short-run surpluses build on top of a secular trend toward more bottling-quality milk. For example, more than 35 percent of all Wisconsin milk has been reported of bottling quality (4). Such pressures to move supplies, especially in the short run, make the search for fluid outlets a continual and diligent one for surplus areas such as the Midwest.

On the supply side, technological changes in crop rotations are having an important effect on complementarity of enterprises. Many Midwest dairy herds have existed for the simple reason that they are economical users of roughage resulting from feed grain rotations which are self supporting in nitrogen. Relative costs of purchased and home grown nitrogen have reduced the need for an economical use of roughage since the

roughage no longer exists on many of these farms. Moreover, current production practices such as minimum tillage are giving greater intensity to Corn Belt fringe area enterprises which may alter rotations even more and in such a way as to reduce complementarity of the dairy enterprise.

Admittedly this paper has not distinguished clearly between market milk and manufacturing-grade milk problems in the comparative advantage framework. Whether this is possible or profitable is open to question. The Midwest sees all segments of the industry closely interwoven. The factors of analysis that set these various segments apart include differences in demand characteristics of products and possibly some justifiable production differences, especially those involving degree of enterprise specialization. However, many more of the differences in analytical factors for the various segments lie in marketing factors rather than in production factors. Cassels, Rojko, and others have sketched these relationships and this paper has purposely avoided them (1, esp. pp. 123-25, 200-11 and footnote 17, p. 112; 10; and 11).

The margin upon which comparative advantage adjustments occur is the nonspecialized fringe areas and the adjustments come basically through manufactured dairy products, not fluid products. Estimates hold that the proportion of manufactured dairy products from bottling-quality milk is at least one third. Growing pressures tend increasingly to make competitive adjustments in fluid supplies. However, this will be a gradual thing unless drastic technological changes, such as production of a competitive concentrate fluid substitute, drastically reduce transfer costs. Thus, not the traditional Midwest areas, but the fringe areas, tend to form the basic adjustment frontier of dairy competitive advantage today.

Some Hypotheses

The reader looking for *the* answer to the riddle of comparative advantage between these two areas has probably languished in despair by now. Such answer has not come and it is yet some distance away if one reads thoroughly the state of our arts in interregional analysis. We trust that this paper has inferred a few provocative hypotheses—hopefully some that future research studies will garnish with evidence. Some that strike the authors as most interesting are:

1. Factors not usually considered economic, such as ethnic background of the people of the Midwest dairy industry, have figured more heavily in setting the stage of comparative advantage than indicated by traditional interregional studies. For example, on ethnic background specifically, what effect has this had on such things as amount of family labor so important in dairy production, specific interest in dairy production—often held as a prerequisite of a successful dairyman, and tendency toward cooperative marketing, which has flourished with dairy products?

2. Short-run adjustments figure prominently in the comparative advantage picture today. Changing surplus milk patterns in fluid markets, possibilities for quick, effective transfers of milk among markets or plants, more multiple processing firm organizations, and higher degree of specialization in the facilitating functions of dairy marketing figure among the factors which prompt this hypothesis.

3. Certain production aspects merit more emphasis than marketing or institutional aspects in interregional analysis. Growing interrelationship between market and manufacturing grade milk, changing Midwest farm enterprise combinations, changing transfer facilities and overpowering influence of widely varying opportunity costs of immobile resources and relatively fixed assets of capital and management in dairying intrigue one in this hypothesis.

4. Comparative advantage studies should consider the total dairy industry rather than restricted kinds of products or geographic areas. Especially in the Midwest, manufacturing facilities depend upon surplus fluid milk. Transfer among all geographic areas is a technical possibility for nearly all dairy products. Analytical techniques to handle problems of greater scope are available.

5. Interregional studies in dairying are of greater relevance today than formerly. Other problems are of sufficient urgency to raise questions of priorities. It has been stated, " It may be entirely possible that the agricultural economist is awakening to the quantitative importance of space-ordered comparative advantages at the very time that technological changes are reducing their importance relative to comparative advantages oriented to management differences and relative to advantages induced for regions by group action not captured in the relations so far included in the models." (21) Resource adjustments do lag (2). Private (short-run) problems of trade have often in history been in conflict with public (long-run) problems (7). Tools of analysis allow planners to do something about large interregional problems if the urgency is established. Thus, should we work this research area diligently?

6. Comparative advantage problems between the conventional dairy areas of the Midwest and the Eastern Seaboard are subordinate to those between the fringe dairy areas and the traditional dairy areas in both the Midwest and on the Seaboard. Specialized areas feel the necessity to adjust but opportunity to do so may not exist. Possibly the Midwest-Eastern Seaboard complex is the wrong place to look for regional dairy competitive adjustments.

Literature Cited

1. Rojko, A. S., "The Demand and Price Situation for Dairy Products," USDA Tech. Bul. 1168, 1957.

2. Snodgrass, M. M. and Charles E. French, "Linear Programming Approach to the Study of Interregional Competition in Dairying," Purdue Univ. Res. Bul. 637, 1958.
3. Whitted, S. F., "Use of Surplus Grade A Milk in 14 North Central Markets," Unpub. Ph.D. Thesis, Univ. of Missouri, 1960.
4. Cook, H. L., "Expanding Out-of-State Milk Sales," *Econ. and Mktg. Info. for Wisconsin*, March 1954.
5. Hassler, J. B., "Pricing Efficiency in the Manufactured Dairy Products Industry," *Hilgardia*, Aug. 1953.
6. Herrmann, L. F., *et al.*, *Regulations Affecting the Movement and Merchandising of Milk*, USDA Mktg. Res. Rept. 98, 1955.
7. Mighell, R. L. and J. D. Black, *Interregional Competition in Agriculture*, Harvard Univ. Press, 1951.
8. French, Charles E. and T. C. Walz, "Impacts of Technological Developments on the Supply and Utilization of Milk," *J. Farm Econ.*, Dec. 1957, pp. 1159-72.
9. NCM-12 Regional Dairy Marketing Committee, "Outer-Market Distribution of Milk in Paper Containers in the North Central Region," Purdue Univ. Ag. Expt. Sta. Bul. 600, Oct. 1953.
10. Cassels, J. M., *A Study of Fluid Milk Prices*, Harvard Univ. Press, 1937.
11. Gaumnitz, E. W. and O. M. Reed, *Some Problems Involved in Establishing Milk Prices*, USDA Publ. DM-2, Sept. 1937.
12. Baumol, W. J., "Spatial Equilibrium with Supply Points Separated from Markets with Supplies Predetermined," USDA ditto report, 1952.
13. Bredo, William and A. S. Rojko, "Prices and Milk Sheds in Northeastern Markets," Mass. Ag. Expt. Sta. Bul. 470, 1952.
14. Fox, K. A., "A Spatial Equilibrium Model of the Livestock Feed Economy in the United States," *Econometrica*, 21:547-56.
15. Hammerberg, D. O., L. M. Parker and R. G. Bressler, "Efficiency of Milk Marketing in Connecticut," Conn. Ag. Expt. Sta. Bul. 237, 1942.
16. Judge, G. G., "Competitive Position of the Connecticut Poultry Industry—A Spatial Equilibrium Model for Eggs," Conn. Ag. Expt. Sta. Bul. 318, 1956.
17. Wheeler, R. G. and John D. Black, *Planning for Successful Dairying in New England*, Harvard Univ. Press, 1955.
18. Jeffrey, A. D., "The Production-Consumption Balance of Milk in the Northeast Region," Cornell Univ. AE 1055, June 1957.
19. Smith, C. W., "New York-New Jersey Order 27 Class I-A Prices in Relation to Interregional Competition," Unpub. materials for testimony at hearing on Class I prices in Northeastern Federal Orders, July 1960.
20. Egbert, A. C. and E. O. Heady, "Interregional Competition or Spatial Equilibrium Models in Farm Supply Analysis," Unpub. paper at Workshop: Estimating and Interpreting Farm Supply Functions, Jan. 1960.
21. Baker, C. B., "Interpretation of Regional and Spatial Models," Unpub. paper at Workshop: Estimating and Interpreting Farm Supply Functions, Jan. 1960.
22. Bonnen, J. T., "Demand Analysis and Data for Regional and Spatial Models of Adjustment," Unpub. paper at Workshop: Estimating and Interpreting Farm Supply Functions, Jan. 1960.
23. Swanson, E. R., "Supply Response and the Feed-Livestock Economy," Unpub. paper at Workshop: Estimating and Interpreting Farm Supply Functions, Jan. 1960.

24. Tolly, G. S. and L. M. Hartman, "Inter-Area Relations in Agricultural Supply," *J. Farm Econ.*, May 1960, pp. 453-76.
25. Cook, H. L., "Milk Movement in the Middlewest: Interregional Competition," Unpub. paper presented at Second Ann. Agricultural Marketing Conference, Ohio State Univ., Nov. 17, 1959.
26. Kranz, D. C., "Reasons for Short-Run Milk Production Changes in the Fort Wayne, Indiana, Milkshed," Unpub. M.S. Thesis, Purdue Univ., 1957.
27. Purcell, J. C., "Prospective Demand for Milk and Milk Products in the South," Ga. Ag. Expt. Sta. Bul. 88, Oct. 1959.
28. Kiehl, E. R., "Changing Patterns in Production and Consumption of Animal Products," Proc., Ninth Natl. Inst. of Animal Agriculture, Purdue Univ., 1959.

DISCUSSION: THE COMPARATIVE ADVANTAGE ASPECTS OF THE CONFLICT

IRVING F. FELLOWS
University of Connecticut

With the first sentence, French and Kehrberg have placed their paper on a non-controversial basis. They chose to identify and discuss some of the basic issues involved and, from this, to draw up a list of hypotheses that might be studied more intensively. In this theoretical framework, attention was centered upon the differential endowment of regions in both physical and human resources, upon transfer cost problems, upon shifting demand characteristics, and upon the impact of technological change.

I found their discussions of each section pertinent, accurate, and useful. But I had hoped more substance would have been added to the framework. I felt I was reading one of those very large menus while waiting for dinner to be served. For a moment I thought of suggesting figuratively that some meat might be added to the theoretical skeleton. But then I realized the meat might be my own neck for I intend to draw some very definite conclusions concerning the Midwest-Eastern conflict of interest in the production and distribution of milk. They stem from the overall conclusion that under existing prices and functional relationships the Eastern milk market is an illusion for farm operators in the Corn Belt and for most operators in the East and West North Central areas. It exists but cannot be penetrated. Perhaps its greatest benefit will be to stimulate these farmers to be ever vigilant in their production and marketing processes and thereby to stimulate economic adjustments.

Before attempting to defend this conclusion allow me to bare and then bury one important assumption. This concerns the spector of some new and revolutionary development in the relevant technology of transfer. As French and Kehrberg have stated, "The current research mandate and

general drive to alter these technical restrictions in such characteristics as bulkiness and perishability will prevail." Yes. But, I cannot read the future. When and how successful these attempts will be is still unknown. Until definite results are known, we must accept the present limitations in the factors affecting our model. Adjustments will follow important new conditions once they are known.

To return now to the main conclusion. What support can I bring for this position?

1. Price relationships and transportation costs are such that it is unprofitable to move milk from the main competitive areas into the eastern markets.

Transporting fluid milk is expensive. A recent study by Hammill and Cochrane showed that transportation costs "are sufficiently high to discourage milk shipments to eastern markets." The same results were obtained by Cook, of Wisconsin. Given the present price relationships in the two markets, a beneficial income effect might be realized in two months of the twelve. But prices would not remain the same; the average blend price would decline in the eastern market and rise in the local midwestern market. Given these directions and the estimated magnitudes of these changes, there is doubt that any positive income effects could be realized. To disagree slightly with the authors, the location of fluid milk areas nearby markets is not happenstance. With the vast amount of potential resources which can produce dairy products, realistic application of comparative advantage principles has led to the development of fluid milk areas adjacent to urban areas.

2. Opportunity costs are so high for the corn belt and most East and West North Central farmers that dairying will not be encouraged.

Under present price relationship and production functions, farmers in these areas have better alternative opportunities than dairying under conditions of limited resources. When it comes down to a decision on an individual farm, and this is where the aggregative problem eventually arrives, the marginal returns for an additional $100 of additional expenditure are greater in other alternatives. This is the basis upon which decisions are made, given an economic emphasis. Technical advances have been greater in recent years in crops and other livestock and this trend promises to continue in spite of attempts to shift to a new production function in dairying. In recent experiments completed at the Iowa Station, output response was greater for a continuous corn rotation under erosion-minimizing techniques than more typical rotations. Elimination of forage in the rotation will eliminate forage-consuming enterprises. Incidentally, having worked with some Iowa farmers, I believe they will be very happy about this new possibility.

3. Technological developments come on all fronts.

In the Minnesota report, several technical possibilities were mentioned to reduce unit transportation costs. While technology improves in one area generally there are technical advances in other production and marketing sectors. For example, research just completed at the Storrs, Connecticut, station has demonstrated a combination of new production techniques which will permit a dairyman to intensify forage yields per acre. At a yield rate of about 6,000 therms of net energy, marginal unit costs of the last 100 therms of net energy would be slightly less than the most favorable alternative source for a similar quantity on the open market. Plans have just been completed on a study to explore the feasibility of a combination of production practices which will permit yields of 8,000 and 10,000 therms within the same cost restrictions. But the marginal open market cost for alternative feed sources may be lowered once the full impact upon costs is realized from such developments as improved materials handling, wafering, the Saint Lawrence Seaway, and water transportation from Florida. This must also be part of the evaluation.

This is how decisions on feed supplies are being made by our more aggressive dairymen. The image of the family farm given to us by Professor Carstensen is disappearing. In its place we must substitute the young businessman, perhaps not in a gray flannel suit, but in his own farm office making his main contribution to his farm by studying resource management and market reports. This new group of dairymen are product fabricators. No longer is resource ownership one of their basic goals. They are concerned primarily with the flow of a resource service. At one time their animals may be fed from the plains of Kansas, at another Florida's citrus groves may be the source. Marginal cost concepts direct their decision process.

4. New market areas will offer superior alternative opportunities.

The population growth in other areas of the country will open new markets for dairymen seeking fluid milk outlets. More rapid expansion in the Southern and Gulf states and in the Midwest itself will present superior market opportunities. Referring again to the Minnesota report, beneficial income effects resulted in 8 of the 12 months in moving milk into a Texas market under the assumptions of the study. More such areas can be found where local production levels have not kept pace with growth in demand.

Other reasons could be advanced and these could have been discussed in greater detail. The ones given do not differ from the theoretical considerations given by the authors. Perhaps they add specification to the more general approach.

THE MIDWEST-EASTERN SEABOARD CONFLICT OF INTEREST IN THE PRODUCTION AND DISTRIBUTION OF MILK: THE ROLE OF MARKET STRUCTURES AND OTHER INSTITUTIONAL ARRANGEMENTS

IRVING DUBOV AND M. LLOYD DOWNEN[1]
The University of Tennessee

I. *Introduction*

IN THIS discussion, the Midwest is defined as the area of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, and Missouri. The Eastern Seaboard is the area of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia, and Virginia. Primary attention is given to potential conflicts between the Chicago and the New York-New Jersey milk marketing areas. It is assumed that these two areas are representative of the Midwest and the Eastern Seaboard, respectively. The product whose production and distribution is discussed is milk produced for fluid consumption.

To fulfill our assignment, we must do several things. *First,* we must identify the parties who could be involved in conflicts of interest between the Midwest and the Eastern Seaboard in the production and distribution of milk. *Second,* we must note the conceptual and empirical settings for conflicts among the parties identified. *Third,* we must examine information on market structure characteristics and market performance to see their relation to any existing conflicts of interest.

II. *Bases for Conflicts of Interest*

Conflicts of interest arise when two or more parties try to attain ends that are mutually exclusive or inherently antagonistic. Conflicts of interest may arise also from incompatibilities in the means taken to attain different ends. That is, the means taken to attain one end may cause side conditions that are unfavorable or antagonistic to the attainment of some other end or ends. These are the basic sources of conflict in any area of human activity—be it economic, political, or social. And so, any conflicts of interest in the economic activity of producing and distributing milk would result from either one, or both, of these general causes.

Let us indicate the parties who could be involved in conflicts of interest in the production and distribution of milk and the bases for these conflicts. There are at least four major groups in each of the two areas

[1] The authors are indebted to Professor R. G. Spitze for many helpful comments made in reviewing early drafts of this paper. Any errors of fact or interpretation, however, are the responsibilities of the authors alone.

delineated (the Midwest and the Eastern Seaboard) who might have conflicts of interest: producers, handlers, retailers, and consumers. Two of these groups, however, could be classified further. Handlers with interregional operations may have interests that are different from those of handlers who have only local or regional operations. By the same reasoning, retailers also could be classified as to scope of operations—interregional and local or regional. Thus, there are at least ten groups in the two regions who might be involved in the so-called conflict of interest: producers, handlers, retailers, and consumers in the Midwest; producers, handlers, retailers, and consumers in the Eastern Seaboard; and interregional handlers and interregional retailers.

Each group has a place in the production-distribution structure for fluid milk according to its buyer-seller position in the markets of this structure. The markets are those between: (1) producers and handlers; (2) handlers and retailers; (3) handlers and consumers (for home-delivered milk); and (4) retailers and consumers (for store-delivered milk). It is in these markets that conflicts of interest between the groups noted could arise. The points of conflict could be prices, quantities bought and sold, market shares, and other related variables of market performance. The resolution of these conflicts is made on the basis of relative *market power* positions. Market power is the degree to which one party can impose its own solution to a market conflict on its adversaries.

There is no basis on which to say *a priori* that all groups in one area have a common community of interest or a common conflict of interest with groups in the other area. In fact, twenty-eight *possible* conflict situations could be sorted out among the eight groups in the two areas whose operations are regional in scope. When interregional handlers and interregional retailers are considered also, an additional seventeen possible conflict situations could be sorted out.

Obviously, we cannot consider all the conflict situations that could be listed. Many are of little or no significance for our problem. It is our assumption that the most important potential conflict situation from the standpoint of this session is that between Midwest milk producers and Eastern Seaboard milk producers. Primary attention will be given to this situation, but the interests of other parties in the production-distribution structure will be noted whenever appropriate.

III. *Conceptual and Empirical Settings*

A. *The conceptual setting*

A market structure is a *competitive environment* within which a *market process* occurs. It is the environment that affects the manner of determining prices, total amounts traded, market shares among sellers, market shares among buyers, and any other results or dimensions of the market

process. Such a structure may be affected by the process that takes place within it. For example, effects of the market process that cause changes in the size-distribution of market participants during one period will change the competitive environment for a later period. Or, prices that are deemed "too high" or "too low" during one period may result in public action that will alter the market structure during a subsequent period.

The market structure framework used in our discussion is the traditional one based on (1) size-distribution of sellers and buyers; (2) product differentiation; (3) conditions of entry; and (4) collusion, regulation, and any other factors that affect market behavior. In using this approach, however, the impact of these market structure factors on market performance will be assessed in terms of the market power concept mentioned earlier—the degree to which one party or another can impose its own solution to a market conflict on its adversaries.

B. *The empirical setting*

1. *First Market—Producers vs. Handlers.* It is estimated that 164,000 farmers in the twelve Eastern Seaboard States produced whole milk and cream for sale in 1957.[2] Of these farmers, 94,000, or 57 percent, were members of milk producers' cooperative associations.[3] The total supply in the area in 1957 for all human consumption purposes is estimated at 25 billion pounds.[4] More than 22 billion pounds of milk were delivered to plants and dealers, and 15 billion pounds (66 percent of the total delivered) were marketed through milk producers' cooperatives, either by direct handling or by bargaining.[5]

A total of 605 milk handlers were reported operating under the New York-New Jersey Milk Order in 1958. These handlers operated a total of 891 plants. The largest firm, in terms of number of plants, was the Dairymen's League, a dual purpose (bargaining and operating) producers' cooperative. This association operated 72 plants itself. In addition, the Borden Company operated 35 plants for the association, and 19 other handlers operated 21 other League plants. Finally, the Dairymen's League reported receipts and utilization for its own producers at 41 other plants. This amounts to 169 plants (19 percent of all the plants in the marketing area) directly or indirectly controlled by this one producers' association.[6]

Two other firms of substantial size (in terms of numbers of plants) also

[2] Estimate based on figures reported in 1949 and 1954 Censuses of Agriculture.

[3] Anne L. Gessner, *1956-57 Statistics of Farmer Cooperatives,* Gen. Rept. No. 60, U.S. Farmer Coop. Serv., Washington, D.C., June 1959.

[4] U.S. Agr. Marketing Serv., *Milk, Farm Production, Disposition, and Income, 1957-58,* Washington, D.C., April 1959.

[5] Dairy Sect., U.S. Farmer Coop. Serv., unpub. records.

[6] Market Administrator, New York-New Jersey Milk Marketing Area, *Plants-Handlers, Freight Zones,* March 1958.

were reported in this marketing area in 1958. They are National Dairy Products Corporation and the Crowley Milk Company. Divisions of National Dairy Products (Breyer, Rieck, and Sealtest) were reported as operating 42 plants. The Crowley Milk Company reported 13 plants in the marketing area. The remaining 650 plants in the marketing area were operated mainly by single-plant firms.[7]

In the seven-state area of the Midwest, there were an estimated 568,000 producers of whole milk and cream in 1957.[8] Of these producers, 448,000, or 79 percent of the total, were members of milk producers' cooperative associations.[9] The total milk supply in the area in 1957 for all human consumption purposes is estimated as 56 billion pounds.[10] About 47 billion pounds were delivered to plants and dealers, and 30 billion pounds (64 percent of the total delivered) were marketed through milk producers' cooperatives, either by direct handling or by bargaining.[11]

A total of 82 handlers operated 134 plants in the marketing area covered by the Chicago Federal Order in 1958. There is no definite indication of dominance by any one firm in terms of number of plants operated. However, the Pure Milk Association—a dual purpose cooperative—operated 23 plants in the area. Other producers' associations operated 15 plants, making a total of 38 for all producer cooperative owned plants, or 28 percent of the total. Only five plants were operated by divisions of National Dairy Products Corporation and nine were operated by Borden.[12]

2. *Second Market—Handlers vs. Retailers.* The size-distribution of fluid milk handlers has been covered. There were 279,440 single- and multi-unit grocery stores in the United States in 1954, with an estimated sales volume of over $34 billion. Of these, 254,803 were single-unit stores and comprised 91 percent of the total number of all stores. But these single-unit stores accounted for only 52 percent of the total volume of sales of all stores. The remaining 9 percent of all stores were multi-unit operations, and they accounted for 48 percent of total sales volume. Finally, multi-unit chain-store companies that had 100 or more units under their control operated only 4 percent of all retail outlets, but accounted for 29 percent of total grocery sales.[13] If we can assume that these multi-unit stores also retail 29 percent of the fluid milk bought from handlers by such merchandisers, then the size-distribution of their purchases in all markets

---

[7] *Ibid.*
[8] Estimate based on figures reported in 1949 and 1954 Censuses of Agriculture.
[9] Anne L. Gessner, *op. cit.*
[10] *Milk, Farm Production, Disposition, and Income, 1957-58.*
[11] Dairy Sect., U.S. Farmer Coop. Serv., unpub. records.
[12] *Federal Order No. 41, Reporter,* June 1958.
[13] U.S. Bu. Census, *U.S. Census of Business, 1954,* Vol. I, Retail Trade, Summary Stat., Chap. 4.

could be an important source of market power when dealing with handlers.

3. *Third Market—Retailers vs. Consumers.* The size-distribution of firms in food retailing has been covered, and there appears to be considerable concentration in this industry. In the markets in which these retailers operate, they face a large number of small, unorganized buyers. The importance of this market as an outlet for fluid milk can be best measured by the volume of total fluid milk sales moving through this channel. It is estimated that 75 percent of total purchases of fluid milk by consumers in the Chicago marketing area are made in retail outlets.[14] Corresponding data for the New York-New Jersey market were unavailable.

4. *Fourth Market—Handlers vs. Consumers.* Data on numbers of sellers in this market have been presented in preceding sections. The volume of fluid milk sales moving through this market measures its importance in the production-distribution structure. In the Chicago marketing area it is estimated that 25 percent of total consumer purchases of fluid milk is made on a home-delivered basis.[15] Data on such sales in the New York-New Jersey market are unavailable.

5. *Summary.* There is bilateral oligopoly of some form in all markets of the production-distribution structure for fluid milk in both the Midwest and the Eastern Seaboard, except in those markets in which consumers are buyers. Consumers are relatively unorganized, and generally take a passive role in accepting prices established by the market process.

In the market between producers and handlers, there is concentration in the size-distribution of handlers in both the Chicago and the New York-New Jersey marketing areas. However, producers' cooperatives of three types (bargaining, operating, and dual purpose) tend to reduce disparities in market power that could be used against the interests of producers.

There is concentration on both sides of the market between handlers and retailers in both areas. Under such circumstances, and in the absence of resale price maintenance and related regulation, a large retailer could exert pressure on small handlers for price and price-equivalent concessions. Similarly, large handlers could exert pressure on small retailers for price and price-equivalent concessions, or for other favored treatment. In either case, whether any price concessions are passed on to consumers is uncertain; it depends on the merchandising policies of the retailer involved.

Relative amounts sold to consumers by handlers and by retailers are a matter of concern in the market power situation. It costs less per unit to

[14] Estimate of executive secretary, Chicago Associated Milk Dealers, reported by Market Administrator's office, Chicago Milk Marketing Order.

[15] *Ibid.*

distribute fluid milk by retail store than by home delivery. If the price differential between home delivery and store sale were to reflect actual differences in merchandising costs, a greater and greater relative amount of retail fluid milk sales might move through retailers. This would require a correspondingly greater volume of purchases by retailers from handlers. And so, the development of a bilateral oligopoly structure would be strengthened in this market.

The only conclusion possible from a look at this aspect of the basic market structure of the fluid milk industry is that there are interest groups involved who have varying amounts of market power. Any conflict of interest between such groups is always being resolved in some manner within existing private and public institutions. The extent to which such resolution is consistent with "public interest" depends on the nature of these institutions. In the production and distribution of milk, the major institutions established for resolving conflicts are those of Federal Order regulation, State Order regulation, health and sanitary regulation, and Federal price support programs. These institutions are considered next.

IV. *Other Market Structure Characteristics*

A. *Federal Order regulation*

Regulation of pricing and distribution of fluid milk by Federal action imposes a certain type of public control on these activities. Some note should be given to the setting for such control in an economy that is generally understood to be "free enterprise." Rainer Schickele gives this rationale for regulatory policies in the "free enterprise" setting: "*Regulatory policies* establish rules of conduct to which groups and individuals must conform in order to assure fair play and prevent undeserved hardship . . . protecting the vulnerable, opening opportunities to as many as possible . . ."[16]

In social control of economic activities, one of the approaches generally taken is that of altering market power relations. There are many obvious examples. Anti-trust regulation increases the market power of buyers and of economically less powerful sellers. Institutions established for regulating wage rate negotiations have tended to increase the market power of the laborer. The Agricultural Marketing Act of 1929 attempted to increase the market power of producers of selected farm commodities by providing for commodity loans to cooperatives and through the operation of a Stabilization Corporation.

Throughout the development and operation of present farm price-income support programs in the United States, beginning with the 1933

[16] Rainer Schickele, *Agricultural Policy*, McGraw-Hill Book Company, New York, 1945, p. 27.

Agricultural Adjustment Act, the important effect of these programs has not been a "just price" effect, but rather a *market power* effect. The extent to which these programs have been effective is the extent to which they have helped farmers to attain higher prices than they would have had to accept in the absence of these programs. Federal Order regulation of milk pricing and distribution and related programs are a part of these market power improvement programs, and their impact on any so-called regional "conflicts of interest" should be considered in a market power framework of analysis.

Federal regulation of pricing and distribution of milk was established first under provisions of the Agricultural Adjustment Act of 1933. The present legal basis for such regulation is the Agricultural Marketing Agreement Act of 1937 and its amendments. The 1937 Act sets these objectives for regulation of milk by Federal Order: (1) orderly marketing conditions in interstate commerce; (2) parity prices to farmers; (3) prices to farmers that reflect the price of feed and available supplies of feed and any other economic conditions affecting supply and demand for milk or milk products; and (4) prices that "insure a sufficient quantity of pure and wholesome milk" when parity prices are not reasonable in view of general economic conditions affecting the supply and demand for milk.[17]

As of July 1, 1959, there were 24 markets regulated by Federal Order in the Midwest and 10 in the Eastern Seaboard States.[18] In 1958 in the New York-New Jersey marketing area (the key area of the Eastern Seaboard), an average number of 51,824 producers per day delivered 10 billion pounds of milk to 443 plants.[19] That same year, in the Chicago regulated marketing area, a daily average of 20,287 producers delivered 5.2 billion pounds of milk to 134 plants.[20] In 1958, 80 percent of all milk delivered to plants in New York was purchased under terms of Federal Milk Orders. The corresponding figure for New Jersey that same year was 84 percent. In Illinois in 1958, however, only 45 percent of all milk delivered to plants was bought under terms of Federal Milk Orders.[21]

The mechanism of Federal Order regulation is the milk marketing order. This is a legal instrument applicable to a specific area that requires all milk handlers to pay specified minimum prices to producers. These minimum prices are established on a basis of use classification, and producers receive "blend" or "uniform" prices that reflect relative amounts used in different outlets, as well as the class price established for each

---

[17] U.S. Dept. Agr., *Compilation of Agricultural Marketing Agreement Act of 1937*, Washington, D.C., 1952.

[18] U.S. Agr. Marketing Serv., *Dairy Situation*, DS-273, Sept. 2, 1959.

[19] New York-New Jersey Milk Marketing Area, *Market Administrator's Bulletin.*

[20] *Federal Order No. 41, Reporter.*

[21] U.S. Agr. Marketing Serv., *Federal Order Market Statistics*, Sept. 3, 1959.

use or outlet.[22] The highest value use is in fluid milk products (Class I); the next highest is in fluid cream (Class II); and the lowest value use is in manufactured dairy products (Class III and/or Class IV). In practice, the key prices are for Class I and Class III and IV uses.

The *stated* "primary standard for establishing Class I prices . . . is the concept of equating the supply with the demand for milk in the marketing area." A proviso is added that: "The 'public interest' is served by an adequate supply in terms of a reasonable price."[23] This "adequate supply" qualification is the real basis for establishing Class I prices under Federal Order regulation. The "reasonable price" associated with the adequate supply *is not one unique price* that "equates supply with demand." *It is the price,* other things being equal, that will bring forth the volume of milk for Class I uses in the market during the period of low milk production on farms in the supply area that will meet the needs of the consuming public in the regulated area.

Two kinds of pricing formulas are used to determine Class I prices: (1) formulas with prices of manufacturing milk or prices of manufactured dairy products as independent variables; or (2) formulas with economic factors such as production costs, disposable income, and wholesale price indexes as independent variables. Federal Order markets in the Midwest use manufacturing milk or manufactured dairy product price formulas to establish Class I prices, while Eastern Seaboard markets use economic factor formulas.

B. *State Order regulation*

As of August, 1959, eighteen states regulated milk pricing and distribution under state milk control programs. Fourteen of these states are in the Eastern regions of the United States, and eight are in the area defined as the Eastern Seaboard in this paper. None of the Midwest states, however, had such programs.[24]

In most cases, State regulation sets minimum prices on milk not regulated by Federal Order, but in some areas prices are set for milk covered by Federal Order (e.g., Philadelphia). Further, the New York-New Jersey Milk Marketing area is regulated under joint Federal-State marketing orders. And so, state milk control programs are largely supplemental to regulation by Federal Order.

The objectives of state milk control programs are, in general, to "assure adequate supplies" of "pure and wholesome" milk at "reasonable prices." Most state programs provide for minimum resale prices for milk at vari-

[22] *Dairy Situation,* DS-273, Sept. 2, 1959.
[23] U.S. Agr. Marketing Serv., *Federal Milk Marketing Orders,* Misc. Publ. No. 732, Washington, D.C., Oct. 1956, p. 23.
[24] *Dairy Situation,* DS-273, Sept. 2, 1959.

ous levels of the distribution structure in an attempt to protect producer prices and to guarantee margins for distributors and retailers. There was no resale price maintenance reported, however, for Massachusetts and New York.

Except for Vermont, all state milk control programs in the Eastern Seaboard use classified pricing plans. So-called "flat pricing" is used in Vermont, but prices arrived at are based largely on blend prices in the Boston marketing area, which, of course, are based on a classified pricing plan.

C. *Health and sanitary programs*

The stated objectives of health and sanitary regulation and inspection programs for milk and milk products are commendable, and the programs are indeed necessary to attain the stated objectives. Each such program, however, has some restrictive effect on the movement of milk and/or milk products. Because of public acceptance of stated objectives of these programs, they afford an ideal means for regulating market boundaries. And so, health and sanitary regulation and inspection programs have come to be one of the major tools for maintaining prices established within regulated areas under Federal or State Orders when intermarket price relations are inadequate for regulating market boundaries.

D. *Price support programs*

Current programs of price support for dairy products are based on the Agricultural Acts of 1949 and 1954. The 1949 Act provided that prices of whole milk, butterfat, and their products be supported at between 75 and 90 percent of parity. The Secretary of Agriculture was given discretion to set the level of support at that deemed necessary to insure "an adequate supply of milk." The 1954 Act continued the provisions of the 1949 Act, and also empowered the Commodity Credit Corporation to use designated funds to distribute milk and milk products to school children, the armed services, and veterans' hospitals.[25]

Price support programs for milk and/or milk products are not concerned with the level of prices in any given market, but only with the general level of prices for milk and its products over the entire nation. An exception to this, however, is that Government purchase prices for butter since 1953 have been higher at some points than at others. When supplies of milk in all markets "become greatly excessive relative to demand," government purchases of butter, cheese, and nonfat dry milk are made under provisions of the 1949 Act and its amendments. These pur-

[25] U.S. Commodity Stabilization Serv., *Compilation of Statutes*, Agr. Hb. No. 113, Washington, D.C., Jan. 1, 1957.

chases tend to support prices of milk for all uses in all areas because of intermarket price dependence and the use of manufacturing milk or manufactured dairy product prices in formulas used to establish prices of milk under Federal and State Orders.

V. *Markets, Prices, and Conflicts of Interest*

A. *Points of interest in the conflict*

Total milk production in the Midwest during 1957-59 averaged about 108 percent of 1950 production. This increase is attributable in large measure to increases in Wisconsin and Minnesota, where milk production during 1957-59 averaged about 20 percent more than in 1950. These two states over the past ten years have produced as much milk, or more, than the entire Eastern Seaboard region—23 to 28 billion pounds annually.

Eastern Seaboard milk production also increased since 1950, averaging about 11 percent more than 1950 production during 1957-59. All states in the region except Rhode Island and New Jersey showed some increase; and New York and Pennsylvania, the two largest milk-producing states in the area, increased 10 and 17 percent, respectively, over their 1950 volume of production.[26]

So it would seem that Midwest dairy farmers, especially those in Wisconsin and Minnesota, have expanded production considerably over the past ten years, and apparently are producing more milk at existing prices than is required in the immediate area; and they would like to sell some of this "extra" milk in regulated markets of other areas, including the Eastern Seaboard.

But when we look at *milk production per capita in the two areas,* we get a different impression.[27] Milk production per capita in the Midwest during 1957-59 averaged only 94 percent of what it was in 1950. In 1959, it was only 91 percent of 1950. In the Eastern Seaboard area, milk production per capita during 1957-59 averaged over 100 percent of what it was in 1950.

So, what *is* the conflict of interest between producers in the two areas? Why should Midwest milk producers be interested at all in shipping milk to Eastern markets? The answer is simply that Midwest producers would like to increase their total returns from the sale of milk produced for fluid uses and feel that if they could sell some of their milk in Eastern markets, they could do so. If they were satisfied with prices and resulting total returns from sales in their own area, they would have no interest in seeking markets elsewhere.

What price relations suggest that they could increase total returns by

[26] *Milk, Farm Production, Disposition, and Income, op. cit.,* annual issues.
[27] Population data from U.S. Bu. Census, *Current Population Reports,* Ser. P-25.

selling milk in the Eastern Seaboard area? Let us examine this question using price data for the Chicago and New York-New Jersey marketing areas. The Federal Order Minimum Class I, Blend, Class III, and Class IV prices in the Chicago marketing area (55-70 mile zone) averaged \$3.84, \$3.51, \$3.07, and \$2.95 per hundredweight of 3.5 percent milk, respectively, during 1956-59. In the New York-New Jersey marketing area (200-210 mile zone) the Federal Order Minimum Class I, Blend, Class III, and Class III Special prices averaged \$5.50, \$4.37, \$2.99, and \$2.85 per hundredweight of 3.5 percent milk, respectively, during 1956-59.[28]

Producers supplying the Chicago market could have increased their total returns *if* they could have shifted milk from local Class III and Class IV uses to sales in the New York-New Jersey area at a net price per hundredweight that was greater than the local prices for these utilizations. Let us assume that it cost \$2.00 per hundredweight to ship milk from Chicago (55-70 mile zone) to New York (200-210 mile zone). *If* Chicago area milk were allowed in the New York-New Jersey marketing area *for Class I uses* during 1956-59, this presumably would have given a net price of \$3.50 per hundredweight for milk shifted from the Chicago area, thereby increasing total returns to Chicago area producers.

Another factor that might indicate the desirability of shipping milk from Chicago to the New York-New Jersey marketing area is the relation between dealers' actual buying prices for *milk used for fluid products* in the two areas. This dealer buying price averaged \$3.95 and \$6.10 per hundredweight of 3.5 percent milk in the Chicago and New York-New Jersey marketing areas, respectively, during 1956-59.[29] If we assume, again, a \$2.00 per hundredweight transportation charge between the two areas, these price data also suggest producers supplying the Chicago market could have increased their total returns *if* they could have shifted milk from local Class III and Class IV uses to sales in the New York-New Jersey area *for Class I uses.*

B. *Barriers to movement of milk*

If the sale of fluid milk in the New York-New Jersey marketing area, in response to interregional price differences, is seemingly so attractive to producers in the Chicago area, what prevents them from making such sales? First, the seeming attractiveness is illusory. *If Chicago area producers shipped milk to the New York-New Jersey marketing area, they could expect to receive, at best, only the blend price less transportation for their milk.* This would give them the same treatment as local producers in the New York-New Jersey marketing area. Using the 1956-59

[28] *Federal Order Market Statistics, op. cit.,* monthly issues.
[29] U.S. Agr. Marketing Serv., *Fluid Milk and Cream Report,* monthly issues.

price data cited above, and a transportation rate of only $1.50 per hundredweight between Chicago and New York, the effective blend price to Chicago area producers would have been 64 cents less than the blend price for milk sold to handlers in the Chicago area.

Second, even if we suppose that the blend price in the New York-New Jersey marketing area initially were high enough to justify movement of milk from Chicago to New York, such a favorable price relation would be of limited duration. This is because the "supply-demand adjuster" in the New York-New Jersey Class I price formula is geared to the Class I utilization percentage in the marketing area. With a relatively fixed amount of milk needed annually for Class I products in the marketing area, any marked increases in the total amount of milk coming into the market (from either local or outside shippers) would reduce Class I utilization percentages. This would lower the Class I price and, therefore, would lower the blend price that originally provided the incentive for shipments by outside producers.

Third, and what is more realistic under existing Federal-State Order regulation in the market, Midwest milk entering the market would be considered "other source" milk. As such, it would be assigned to the lowest use class for pricing. Under normal conditions, the Class III or Class III Special price would give no incentive for movement of milk from the Midwest.

Finally, if it ever seemed that Midwest producers could economically ship milk to the New York-New Jersey market on a regular basis, it would not be surprising to find local producers exerting considerable pressure for the use of sanitary and health regulation and inspection programs to impede the entry of this outside milk. Under present intermarket price relations, however, such measures do not seem necessary.

C. *Barriers to movement of cream*

Prices of 40 percent cream on the New York market are substantially above those in other areas. The price per 40-quart can averaged $27.39 in Boston during 1956-59, while the corresponding price in New York was $35.06 per can.[30] During the same period, on the basis of Class III prices in Chicago and transportation costs to New York, it is estimated that Midwest shippers could have put 40 percent cream in the New York market at an average price of $30.34 per 40-quart can—or $4.76 less than the average price that prevailed in this market during the period.

An Agricultural Marketing Service study of regulations affecting the movement and merchandising of milk explained the high level of cream prices in the New York area thusly:

---

[30] U.S. Agr. Marketing Serv., *Dairy and Poultry Market Statistics*, annual issues.

. . . [New York City] will not inspect plants beyond the western boundary of Pennsylvania. Also, the city, in common with many other markets, permits cream to be obtained only from farms and plants meeting the requirements for fluid milk. The order accordingly prices milk used for cream so that the plants in the outer zones of the milkshed will obtain about as great a net return from shipping cream and fluid skim milk products to market as would be obtained from shipping fluid whole milk. . . . Were the New York City Health Department willing to inspect midwestern plants and its requirements were approximately equivalent to those of the fluid milk markets for which these plants are presently qualified, they could be expected to offer cream for shipment into New York at prices commensurate with those prevailing in Boston and Philadelphia. . . .[31]

D. *Intramarket interests*

It was said at the outset of this paper that there was no basis on which to say *a priori* that all groups in one area would have a common community of interest or a common conflict of interest with groups in the other area. Also, it was said that while primary attention would be given to potential conflicts between Midwest producers and Eastern Seaboard producers, the interests of other parties would be noted when appropriate. Accordingly, let us note how parties in the New York-New Jersey marketing area are affected by some of the factors that bear on interregional interactions of interests.

During 1956-59, wholesale prices for 92-score butter averaged 0.98 cents a pound higher in New York than in Chicago, and wholesale prices for American process cheese averaged 1.33 cents a pound higher in New York than in Chicago.[32] With these price differences and standard yields of products obtainable from 100 pounds of milk testing 3.5 percent butterfat, the gross value of 100 pounds of milk used for butter would be about 4.2 cents higher in New York than in Chicago, and almost 11 cents higher in New York than in Chicago when used for cheese.

Moreover, fluid milk handlers in the New York-New Jersey marketing area who have manufacturing facilities pay lower prices for milk used for butter and cheese than do similar handlers in the Chicago area. During 1956-59, the New York-New Jersey Class III Special price (for milk used for butter and cheese) averaged $2.85 per 100 pounds of 3.5 percent milk. During the same period, the Class IV price in Chicago (also for milk used in butter and cheese) averaged $2.95—ten cents more than the corresponding New York-New Jersey price.[33] This means that there was a *gross* margin of 14.2 cents a hundredweight for milk used in butter in favor of New York-New Jersey handlers with manufacturing facilities, and a gross margin of 21 cents a hundredweight for milk used in cheese

[31] U.S. Agr. Marketing Serv., *Regulations Affecting the Movement and Merchandising of Milk*, Marketing Res. Rept. No. 98, Washington, D.C., June 1955, p. 46.
[32] *Dairy and Poultry Market Statistics*, annual issues.
[33] *Federal Order Market Statistics.*

by these handlers. So, given the relatively high Class I price in the New York-New Jersey marketing area which encourages total production of milk for fluid uses and the relatively low price for milk used for butter and cheese, the handling of milk for fluid uses in excess of bottling requirements would be a relatively attractive undertaking in the area, *if* the gross margins mentioned above are more than enough to compensate for any higher manufacturing costs in the New York-New Jersey area.

What are the interests of the parties directly affected by this relative price structure? A handler with both fluid milk and manufacturing facilities has his own special interest. He needs to maintain his pool status; and so long as his manufacturing operations are profitable, he wants an increasing supply of milk produced for fluid use that can be used in manufacturing. Such a handler, therefore, would be satisfied with a relatively low price for milk used in butter and cheese. A handler engaged exclusively in fluid milk operations, however, would not be satisfied, as he would be making payments into the equalization fund continually. There is a possibility, also, that he may consider acquiring manufacturing facilities himself. Once he made an investment in new facilities, he would have strong reason to acquire the additional supplies of milk produced for fluid use to take advantage of these new facilities. The added supply, of course, would be in addition to his normal requirements for bottling purposes.

Next, there are the interests of producers and producer groups. A substantial portion of the fluid milk in the New York-New Jersey area is handled by producer-owned operating cooperatives, and these cooperatives are important producers of dairy products made from surplus milk produced for fluid use. Under the favorable price structure described for manufacturing operations, producer organizations with fluid and manufacturing facilities are in the same advantageous position as proprietary concerns with the same facilities.

Milk producers' bargaining associations in the New York-New Jersey marketing area who do not operate manufacturing facilities would favor an *increase* in the level of Class III prices, because of its effect in raising blend prices. In this way, their members could obtain a share of the higher gross values of fluid milk used in manufacturing that results from the higher local wholesale prices for butter and cheese. The institutional arrangements in the market have been such, however, that such associations have not been successful in securing this altered price structure. The ownership of manufacturing facilities by operating or by dual purpose associations gives such producer groups a community of interest with proprietary concerns in maintaining relatively low Class III prices. This community of interest, of course, is in conflict with the interest of bargaining associations in raising Class III prices.

VI. *A Final Word*

In a setting of imperfect competition in the fluid milk industry, Federal Orders, State Orders, health and sanitary programs, and Federal price support programs are used to alter market power positions in favor of milk producers in their dealings with handlers. The first three types of programs are used to alter market power positions in given fluid milk marketing areas; the fourth is a blanket program for all milk producers.

The desire of Midwest producers to sell milk in Eastern Seaboard markets results from dissatisfaction with prices and total returns in their own local markets. However, the operation of Federal Order pricing and related regulation in Eastern markets makes the attainment of higher total returns to Midwest producers by sales in Eastern markets economically unfeasible. Therefore, given the institutional arrangements for pricing and regulating milk distribution in Eastern Seaboard markets, we submit that the relevant area of concern for improving the market power position of Midwest producers is not the conflict of interest between them and Eastern Seaboard producers. *Rather, it is the conflict of interest between Midwest producers and the Midwest handlers to whom they sell their milk.* To obtain higher returns for their fluid milk, Midwest producers should take the direct approach of altering market power institutions within their own marketing areas, rather than pursuing the illusory benefits of sales in seemingly lucrative Eastern Seaboard markets.

DISCUSSION: THE ROLE OF MARKET STRUCTURES AND OTHER INSTITUTIONAL ARRANGEMENTS

LINLEY E. JUERS
Wisconsin Council of Agriculture Cooperative

The words "Midwest-Eastern Seaboard" in the title of this session suggest to me that the location of milk producing resources and the competition between the owners of these resources in the two separate regions is the central question rather than such other incidental conflicts of interest as might exist within or around this inter-regional conflict. The singular "the" at the beginning of the title further suggests a unique and definitive conflict that exists between these areas with the principals in the conflict being likewise definitive and recognized as such. It has thus been my assumption since first hearing the plans for this session that the conflict to be discussed would be the rather well publicized conflict between milk producers in the two areas. The authors have in their paper, by emphasis if not by direct statement, borne out this assumption and

focused their efforts toward some conclusions with respect to the inter-regional conflict between milk producers.

While some parts of the paper by Dubov and Downen relate to intra-market conflicts, I will direct my discussion to the parts that deal with inter-market conflicts and more specifically the inter-market producer conflicts. I might say at the onset that I find myself somewhat in disagreement with the authors, both in their statement as to the basis of this inter-regional conflict and the conclusion which they offer relative thereto. The authors' appraisal of this conflict as stated is, ". . . the conflict of interests between producers in the two areas . . . is simply that Midwest producers would like to increase their total returns from the sale of their milk produced for fluid uses and feel that if they could sell some of their milk in Eastern markets they could do so."

The authors then proceed to compare fluid milk price relationships between the two areas, adding transportation costs to the Midwestern prices in comparing them with prices which exist in the Eastern area. Following this bit of arithmetic the authors are led to the conclusion that the attainment of higher total returns to Midwest producers by sales in Eastern markets is economically unfeasible. They then suggest with respect to the Midwest producers, "Rather, it is the conflict of interest between Midwest producers and the Midwest handlers to whom they sell their milk."

If one were to accept the authors' assumption as to the basis for conflict between Midwest and Eastern producers, these conclusions might follow in part. It seems to me, however, that this is a rather narrow conception of the problem and that an entirely different set of conclusions might be reached if the inquiry were based on a somewhat different set of assumptions and facts.

The authors seem to have confined their concept of the conflict situation to the production and marketing of fluid milk. By so doing I think they have excluded the major contention of competitive interest being expounded by the Midwest. An earlier phase of the conflict possibly did center on Midwestern desires to ship additional supplies of fluid milk to the higher priced markets of the East. Interest of this nature, however, seems to have subsided as the feasibility of making such shipments has been challenged if not disproved repeatedly by various research efforts. Relatively low returns on milk production in the Midwest, relative to the Northeast, continue, however, and interest in improving the relative position of Midwestern dairymen persists.

At present the conflict seems to center more on the effect of surplus products from fluid milk markets as they contribute to generally low prices for manufactured milk and the inability of Midwestern producers

to manifest such competitive advantage as they might have in the production of manufactured dairy products due to the rigors of the varied regulatory institutions affecting milk pricing and marketing.

This competitive advantage may lie entirely in the production of milk for manufactured products, in which case the point of interest is not the exclusion of these products from markets but the protective umbrella which the classified pricing system places over the competitors which Midwestern producers face in the product markets.

Bressler suggests that "The classified price system itself is an effective barrier to entry if it is enforced by an agency with power extending across State lines, for this plan effectively eliminates the incentives for milk dealers to reach out and buy milk from low-priced and unregulated sources."[1] If one accepts the adequate supply criterion as the basis for establishing Class I prices under Federal Orders, as the authors suggest, and examines pricing under some of our larger Federal Orders in the East, I think there is room for a question as to whether this criterion has been adhered to. A comparison of the cost of milk under the New York-New Jersey Federal Order, considering the uses to which milk under that order is allocated, with the cost of alternative supplies for each use class suggests that the pricing policies under this Order have exceeded any reasonable adequate supply guide line and approached something closer to price discrimination on the basis of relative demand elasticities.

While the act does not specifically so state, the administrative history of Federal Orders seems to suggest that the pricing objective is to bring forth an adequate supply of milk for *fluid* or Class I usage. In practice, however, and most notably in certain Eastern markets, pricing criteria seem to have aimed at maintaining a degree of stability for a given, historically present supply of milk, irrespective of its adequacy or over-adequacy with respect to Class I demands from the market for which it is intended.

In a static sense there is evidence of misallocation of productive resources in the fact that large percentages of pooled milk in the East go into uses returning less than the price at which producers are willing to produce milk in that particular area. These excessive quantities of surplus, while recognized in decision making with respect to prices, are abided in administration of the Orders as necessary operating reserves for the given markets on a year around basis.

The question which seems to reflect to me the Midwestern bone of contention is whether a lower-cost total supply of milk might not be available to a given market at present product prices if alternative sup-

[1] Bressler, R. G., "Pricing Raw Product in Complex Milk Markets," *Agr. Econ. Res.*, USDA, Oct. 1958, p. 113.

plies were considered in all use classes and judging adequate supply within periods shorter than the calendar year.

Producers in the Northeast presently receive blend prices in the neighborhood of between $4.25 and $4.50 for all the milk they produce. This is a price at which producers in that area have demonstrated a willingness to produce milk and have produced more than an adequate supply of milk relative to Class I needs. Here it must be granted that even at low $3.25 Northwestern Wisconsin Grade A milk prices, transportation makes the Midwest noncompetitive on an annual basis for the Class I market. On cream, however, where transportation is possibly only one-third as much on a milk equivalent basis, the Midwest could compete.

In the manufactured products such as butter, dried milk or cheese, there is no question but what the Midwest can supply these at a cost substantially less than the $4.25 to $4.50 which the markets in the East are currently paying for milk going into these products.

Even on Class I supplies, with respect to the adequate and necessary reserves, if considered on a shorter-period basis rather than annual adequate supply, it may even be possible that Midwestern milk might be used seasonally and contribute to a lower-cost total supply for a given market. That is to say, if Northeastern producers would produce an adequate supply of Class I milk for eight months of the year for $4.50, raising the price to $5.50 to bring in Midwestern milk as supplemental supplies during the other four might provide a lower cost Class I milk supply than maintaining the $5.50 Class I price the year around and subsidizing excessive surplus over the other eight months.

Advantages sought by the Midwest in this context are not necessarily access to higher-priced markets or greater efficiency in milk marketing as such but rather a somewhat greater degree of equity in price treatment which if necessary can be justified on the efficiency arguments. The general dairy price situation of recent years suggests some over-all adjustment of supplies is in order. Under present price relationships between the areas, the incentive to adjust is seemingly greater in the Midwest, which is, in fact, showing some response recently, whereas in other areas supply increases continue to be noted. This adjustment is assumed by Midwesterners to be contrary to what might be indicated on the basis of efficient allocation of resources, and is particularly contrary to the interests of varied segments of the Midwestern dairy industry, which would, of course, rather expand than contract.

Thus I cannot agree with the authors of the paper that the Midwestern claims in "The Midwest-Eastern Seaboard Conflict of Interests in the Production and Distribution of Milk" are vacuous, as I think there are some aspects, particularly of the institutional arrangements, which are open to

question. It may be granted that many of the Midwestern acquisitive desires toward high-priced markets are not well founded, but this is not the sole contention of the Midwestern dairy industry in this conflict.

I also have some reservations in accepting the authors' analysis relative to the structural characteristics of the markets involved and the significance of structural characteristics in the inter-area conflict under discussion. I first question whether they have selected the appropriate variable to measure the size distribution of sellers and buyers. I think that relative share of the market, as either seller or buyer, at a given market level is the measure sought, which may not necessarily correlate directly with number of plants owned or controlled. Possibly more significant, I think they may have failed to distinguish appropriately between sellers and buyers. The cooperative associations, which they count with the total number of plants on the market, in the buyer sense, while physically operating as buyers, in the market structure sense represent an extension of the seller interest. This distinction I think is later recognized by the authors in their digression on "intra-market interests," where they discuss the possibly inconsistent community of interest between facility-operating cooperative associations and proprietary concerns.

I would also like to suggest a further point not touched on by the authors relative to market structure and the bearing of structural characteristics on the inter-area producer conflict. Assuming as I have in the earlier part of my discussion that a basis for competition exists between the two areas, some estimate of the relative market power of producers in the two areas suggests itself. While the competition is not entirely economic in the precise sense of competing in a market, with favorable government decisions being part of the competitive goal, the same market structure framework seems applicable. It occurs to me that there are possibly some very significant differences in the power position of producers in the two areas which are worthy of analysis. Specifically, the size of market for the Eastern producer is essentially limited to a given population center and fluid milk, whereas Midwest producers compete on a much larger and more diversified market. The degree of organization of producers in fluid milk markets around their particular competitive objectives is generally greater. In addition to this possible size advantage, in the case of the New York market the Federal Order grants cooperatives a resource advantage through the cooperative service payments out of the pool. Sanitation restrictions on milk acceptable to the market, also, might well be construed as a positive factor either in product differentiation or conditions of entry.

RURAL-URBAN COMPETITION FOR WATER

CHAIRMAN: HARRY A. STEELE, AGRICULTURAL RESEARCH SERVICE, USDA

PRICE AND ASSESSMENT GUIDES TO WESTERN WATER ALLOCATION

KARL GERTEL AND NATHANIEL WOLLMAN*

Agricultural Research Service, USDA, and Resources for the Future, Inc.

WHEN we were first given our assignment, we considered discussing the role of water pricing in agricultural and nonagricultural water uses. This discussion would have led us into an account of how much of the water currently used is sold, how much self-supplied, how costs are met, the degree to which costs are reflected in user charges, and a comparison of user charges with the productivity of water.

Such a discussion would quantify some generally known facts but would tell us little about the resolution of competition for limited water resources.[1] Analytical aspects would lead us quickly into institutional and

* The suggestions concerning the general orientation of this paper, made by John V. Krutilla, Resources for the Future, Inc., and the comments of Melvin L. Upchurch, Farm Economics Research Division, Agricultural Research Service, United States Department of Agriculture, are gratefully acknowledged. The authors wish also to thank Erna Peters, of Resources for the Future, for her help in preparing the tables. Sincere thanks are expressed to the U.S. Bureau of Reclamation, whose records were placed at the authors' disposal. However, the statements and opinions expressed are solely those of the authors and do not necessarily reflect the views of the U.S. Department of Agriculture or Resources for the Future, Inc.

[1] Briefly, these facts are as follows. In 1955, an average of 240 billion gallons of water per day was withdrawn from ground and surface sources, of which 110 b.g.d. were used for irrigation and 116 for manufacturing, mining, and fuel-electric power. The remaining 14 b.g.d. represent domestic and commercial uses including rural uses, domestic and farm, other than irrigation. U.S. Geol. Survey Circ. 398, *Estimated Use of Water in the United States, 1955.*

In addition, some 352 b.g.d. were used for hydroelectric power generation in 1954, in unduplicated flows, that is, in flows that did not constitute joint uses of water for power and other purposes. On the same basis, 281 b.g.d. were used for navigation and 78 b.g.d. for fish and wildlife.

Of the 116 b.g.d. used for manufacturing, mining, and fuel-electric power, about 95 percent was self-supplied, with users incurring supply costs. In 1949, about 46.5 percent of the acreage irrigated was served with water from farms which provided water for themselves and possibly one or more neighboring farms. The remaining 53.5 percent was served by irrigation supply organizations. For various historical and other reasons, charges for water by supply organizations are not directly related to cost or marginal productivity of water. Frequently, public supply systems that serve cities do not relate their water charges to costs of supply but draw from or add to general tax funds. However, they are moving in the direction of meeting costs from user charges. Development costs for water power are generally met from power sales, at varying interest rates. Little or no charge is made for meeting costs of flow uses of water, such as navigation and recreation.

legal arrangements that are fundamental to the price structure for water service.

Our objective, therefore, became the determination of what allocation of water resources would result if prices water users would be willing to pay, together with the cost of supply, were to guide water allocation. Although the outcome of such an allocation is of both theoretical and practical interest, we have no basis for recommending exclusive reliance on user payments for future water development.

Let us say at the outset that we have failed to achieve our objective. Nevertheless, we hope that among the shambles of this failure may be found a few facts that have salvage value.

I. *The Physical Range of Competition for Water*

Here we draw on a synthesis of the work of the Senate Select Committee on Water Resources. Federal agencies were requested to project national requirements for food, fiber, industrial and mining products, and power, given a rise in national population to 329 million in the year 2000 and a rise in the Gross National Product from an estimated $519 billion in 1960 to $2,200 billion, at 1960 prices, in 2000.[2] The productive activities needed to meet these requirements and the corresponding water needs were distributed over 22 water-resource regions. The projections for major groups were made independently. Thus, physical and economic limitations of water supply were not formally considered, although the more obvious limitations were recognized. The resulting water-use projections for the medium population level in the year 2000 are compared with 1954 water use for the nine western water-resource regions to which this paper is limited (Table 1).[3]

These projections may be taken as a rough approximation of water requirements resulting from an efficient allocation of economic activities in terms of a least-cost production of a fixed output if water costs to users were to remain at current levels.[4] The projections give at least the general direction of economic future water development when combined with the cost of (1) meeting water requirements within the regions, (2) relocating activities to other regions and (3) modifying or substituting production processes.

[2] Projections of water use made by the Select Committee were for 1980 and 2000 at three levels of future population. For brevity, only the medium projections for 2000 are considered in this paper.

[3] For 1954 as for 2000, the figures for agriculture represent water requirements designated to maximize yields at estimated efficiencies of water use. Actual use in 1954 was considerably smaller than the amount computed in this way.

[4] As the regional projections were made independently, they may fail to take into account certain resource restrictions other than water. However, with increasingly reduced costs of movement of labor and raw materials, this omission may not invalidate the overall conclusions.

TABLE 1. WATER USE AND SUPPLY 1954, AND PROJECTIONS FOR 2000 AT MEDIUM POPULATION LEVELS, 9 WESTERN WATER-RESOURCE REGIONS

(In millions of gallons per day)

Use	South Pacific				Central Pacific				Pacific Northwest			
	1954		2000		1954		2000		1954		2000	
	Gross	Depletions	Gross	Depletions	Gross	Depletions	Gross	Depletions	Gross	Depletions	Gross	Depletions
Agriculture[1,2]	6,601	3,894	4,558	3,052	46,973	27,641	37,512	24,394	22,756	12,492	21,812	13,649
Mining and manufacture	446	65	2,658	416	572	128	3,916	977	1,196	88	19,378	927
Thermal power	2,678	12	17,855	77	1,786	7	24,997	104	—	—	16,962	5
Municipal	1,104	221	3,420	684	733	147	2,715	543	762	154	2,262	452
Land treatment and structures[3]	−11	—	−18	3	90	53	235	149	421	140	915	311
Fish and wildlife habitat[4]	—	32	—	64	—	3,757	—	7,514	—	1,149	—	2,304
Waste dilution[5]	—	—	11,400	—	—	—	9,900	—	—	—	19,000	—
Total requirement[6]	—	—	—	15,664	—	—	—	39,771	—	—	—	38,859
Average flow prior to use[7]	1,600	—	—	—	58,000	—	—	—	143,000	—	—	—

	Great Basin				Colorado River				Upper Rio Grande and Pecos			
Agriculture[1,2]	12,272	7,285	9,229	6,069	26,403	15,595	19,965	13,182	8,783	5,071	7,011	4,788
Mining and manufacture	167	30	791	205	102	29	1,405	499	85	26	800	102
Thermal power	—	—	2,678	99	—	—	8,035	643	—	—	2,678	150
Municipal	172	34	579	116	187	37	647	129	84	17	270	54
Land treatment and structures[3]	102	12	219	24	255	59	705	155	204	92	533	229
Fish and wildlife habitat[4]	—	5,306	—	10,612	—	2,559	—	5,182	—	1,490	—	2,981
Waste dilution[5]	—	—	1,700	—	—	—	4,513	—	—	—	3,610	—
Total requirement[6]	—	—	—	13,507	—	—	—	21,685	—	—	—	10,332
Average flow prior to use[7]	10,500	—	—	—	13,500	—	—	—	3,550	—	—	—

	Upper Missouri				Upper Arkansas AWR				Western Gulf			
Agriculture[1,2]	25,369	13,839	32,462	20,474	6,181	3,726	6,565	4,582	14,310	9,192	13,960	9,955
Mining and manufacture	378	32	2,290	136	189	82	1,331	502	3,245	616	38,969	4,429
Thermal power	1,786	27	11,606	174	1,786	98	8,035	442	4,464	102	24,104	549
Municipal	372	74	867	173	251	50	581	116	667	133	1,907	381
Land treatment and structures[3]	1,504	966	3,855	2,471	494	229	1,227	557	340	191	1,374	740
Fish and wildlife habitat[4]	—	17,696	—	35,328	—	1,146	—	2,293	—	12,566	—	25,386
Waste dilution[5]	—	—	10,990	—	—	—	4,600	—	—	—	14,800	—
Total requirement[6]	—	—	—	51,084	—	—	—	11,717	—	—	—	43,483
Average flow prior to use[7]	29,000	—	—	—	13,000	—	—	—	46,000	—	—	—

[1] Predominantly irrigation, includes watering of farm animals and farm and nonfarm rural domestic requirements.

[2] The figures shown are for *requirements* at specified levels of efficiency, which are assumed to increase considerably from 1954 to 2000: U.S. Senate Select Committee on National Water Resources, *Land and Water Potentials and Future Requirements for Water*, 86th Cong., 1st sess., Comm. Print 12, Tables 39–41, 1960. Actual irrigation uses in 1954 were considerably below requirements for most regions.

[3] Soil and water conservation practices, farm ponds, small structures for watershed protection and irrigation.

[4] Evapotranspiration from wetland areas, gross use not determined for this category.

[5] Assumes a level of treatment of biochemical oxygen demand that minimizes flow requirements for waste dilution and provides 4 milligrams of dissolved oxygen per liter. Treatment levels range from 90 to 97.5 percent removal of biochemical oxygen demand (BOD). Waste dilution requirements not determined for 1954. For land treatment and structures and fish and wildlife, only

Shown also in Table 1 is the average streamflow at the lowest point or points in each region that would occur if there were no diversions. Average streamflow prior to use sets the upper physical, long-term limit on water supply generated by runoff in each region. This limit applies to the sum of depletions plus the flow below which streams must not be depleted.[5] Waste dilution is the only flow use shown, because it is assumed to be the ruling flow in all 9 regions. The sum of depletions limited by average streamflow are depletions from agriculture, mining and manufacturing, thermal power and municipal uses, and the increases above 1954 of depletions from land treatment and structures and fish and wildlife habitat.

Flow requirements in the year 2000 are the sum of depletions limited by average streamflow plus waste dilution, the ruling flow to be maintained. It is assumed that flows required for navigation, hydroelectric power, and fish habitat will be met if flows for adequate waste dilution are provided. The requirements for waste dilution were determined from the projection of population and industrial activity, on the assumption that the dissolved oxygen content of streams would be maintained at an average of four parts per million and that waste treatment would be carried to the point at which waste dilution for biochemical oxygen demand (BOD) and algae was minimized. Because of the interaction between BOD removal and algae growth, the level of treatment could not proceed to 100 percent BOD removal, but had to stop short, usually at 90 or 95 percent. This is roughly twice the present national average. On a physical basis, projected needs for water cannot be met in 5 of the 9 water-resource regions even without an allowance for waste dilution; the South Pacific, the Great Basin, the Colorado, the Upper Rio Grande and Pecos, and the Upper Missouri. In 1954, depletion requirements from withdrawals exceeded the long-term supply in the Upper Rio Grande and Pecos, the Colorado, and the South Pacific.

II. *User Cost of Water and Repayment Capacity, 1954*

For irrigation uses, we present (1) payments made in 1950 per acre-foot delivered by supply organizations, (2) examples of maximum payment capacity per acre-foot delivered for 3 recent project plans of the U.S. Bureau of Reclamation and (3) imputed returns per acre-foot delivered for irrigation (Table 2).

Current charges for water by irrigation companies, mutuals, districts,

[5] Water may become limiting before the sum of depletions from future development and flow uses reaches the level of average remaining streamflow if there is imbalance between the intraregional distribution of supply and demand. In the short run, limitations on water supply may be overcome by drawing on accumulated ground-water reserves.

TABLE 2. CHARGES FOR WATER DELIVERED BY IRRIGATION SUPPLY SYSTEMS, 1955, AND INDICATORS OF REPAYMENT CAPACITY[1]

Water-resource region	Rates per acre-foot of irrigation supply systems, 1950		Examples of maximum repayment capacity estimated for 3 project plans by U.S. Bureau of Reclamation[4]						Maximum returns per acre-foot, 1954, imputed[5]	Difference in irrigated[6] and dryland values, 1954	
			1		2		3				
	Mean[2]	Upper quartile[3]	Capacity per acre-foot	Price index	Capacity per acre-foot	Price index	Capacity per acre-foot	Price index		Per acre	Per acre-foot
	Dollars	*Dollars*	*Dollars*		*Dollars*		*Dollars*		*Dollars*	*Dollars*	*Dollars*
South Pacific	7.0	13.2	39.1[7]–56.8[8]	A	51.3[9]	B	65.6[8]	B	70.7	1,386	495
Central Pacific	1.9	3.1	7.2[9]	B	16.9[9]	A	17.5[9]	A	19.7	460	148
Pacific Northwest	.7	1.4	4.3[9]	B	4.6[9]	B	5.0[9]	B	5.6	245	58
Great Basin	.6	1.0	2.3[9]	A	2.7[9]	A	4.6[7]	B	9.3	259	65
Colorado River	1.6	3.7	2.1[7]–3.7[8]	B	3.5[7]–4.8[8]	B	4.5[9]	B	10.2[10]	354	79
Upper Rio Grande and Pecos	1.2	2.5	2.8[8]	A	5.8[7]	A	7.3[7]	A	16.3	359	144
Upper Missouri	.8	1.6	5.1[9]	B	5.3[9]	B	5.9[9]	A	12.4	115	42
Upper Arkansas	.9	1.5	7.5[9]	A	12.1[9]	B	15.0[9]	B	[11]	182	78
Western Gulf	4.7	6.9	9.7[7]	B	10.5[9]	B	15.6[7]	B	22.7	179	72

Price level comparisons (1910–1914=100)	*1950*	*1954*	*Index A*	*Index B*
Prices received	258	249	215	250
Prices paid	256	281	215	265
Parity ratio	101	89	100	94

[2] 1950 U.S. Census of Agriculture, Vol. 3, Irrigation of Agricultural Lands, County Table 2, part 4 of 4, 1952.

[3] County averages for those counties accounting for 25 per cent of total deliveries in each region; counties ranked in descending order of average rate per acre-foot delivered.

[4] No contingency allowance deducted. Actual repayment is negotiated, generally at a lower level.

[5] Computed by deducting market costs of associated inputs from marginal returns per irrigated cropland acre; see text, p. 1337 and footnotes 6 and 7.

[6] Difference in means of market value of crop reporting districts and weighted by irrigated acreage in crop reporting districts. For details see text footnote 9.

[7] Mean for total supply consisting of project deliveries and other supplies.

[8] For supplemental supply provided by project

[9] For full supply provided by project.

[10] Associated costs, deducted from marginal returns, were for the lower Colorado rather than the entire Colorado River Water-Resource Region.

[11] Not computed.

and other private and public organizations, bear only a crude relationship to what users can afford to pay. The Bureau of Reclamation repayment capacity figures represent the maximum residual available for payment of all water charges after deducting a modest family living allowance from budgeted net farm income on project farms. It is a maximum in the sense that payment of such charges would leave no incentive to adopt irrigation except to the extent that pre-project earnings are less than the family living allowance deducted in determining the payment capacity. In recognition of this, the actual repayments negotiated between irrigation districts and the Bureau of Reclamation are generally at a lower level to provide for incentives and contingencies. The budgets are for family farms of modest size and are designed to reflect average earnings over a number of years including the development period. After the initial development period, repayment capacity would be higher for somewhat larger irrigated units.

The three examples of repayment capacity shown in Table 2 were randomly selected from recent project plans. Therefore the figures are not likely to cover the full range of all existing and planned Reclamation Projects although it is hoped that the examples reasonably represent the range of the more recent project plans.

The imputed returns were derived from marginal returns per irrigated acre of cropland harvested, estimated from the preliminary results of Cobb-Douglas functions developed by Vernon Ruttan.[6] From the marginal returns per irrigated acre of cropland at the arithmetic mean of the variables obtained for counties, associated costs of production were deducted to leave a residual return to off-farm water supply. The residual was then divided by estimated farm deliveries. Associated costs were all inputs not considered in the derivation of the Cobb-Douglas function, valued at 1954 market prices, computed for major irrigated crops, and weighted by acreage.[7] Land charges were taken as dryland cropland

[6] Ruttan, V. W., and Headley, J. C., "Projections of Irrigated Acreage and Water Use, 1954-1980" (Purdue Univ. and Univ. of California, Prelim. Draft, Feb. 8, 1960, estimates subject to revision). The marginal productivities per irrigated acre of cropland were computed by applying coefficients derived from Cobb-Douglas functions for type-of-farming regions, to mean output and input data obtained for water-resource regions. The coefficient for the California Type-of-Farming Region was applied to the Central and South Pacific, Colorado River, Upper Rio Grande and Pecos, and Great Basin Water-Resource Regions. The Northwest Type-of-Farming Region was applied to the Northwest Water-Resource Region, the Northern Plains to the Missouri Basin, and the Southern Plains to the Western Gulf Water-Resource Region.

[7] After considering the results of several alternative functions and other data, it was decided not to include labor, livestock, investment and fixed tractor costs as associated costs. These variables were considered but not included in the final equation. Several approximations of associated costs were made, principally as follows: Colorado: Imperial County, California, and Arizona, as representative of the Lower

[10] Associated costs, deducted from marginal returns, were for the lower Colorado rather than the entire Colorado River Water-Resource Region.
[11] Not computed.

values plus capital outlays for farm distribution of water.[8] The imputed returns represent a maximum, incorporating all the surplus above market costs into water payment. The returns may also include some of the factors, principally part of the additional labor required for irrigated crop production, that were considered but not included in the equation from which returns per irrigated acre of cropland were derived.

The last item in Table 2 is the difference in mean value of irrigated and dryland values in 1954.[9] These were reported by crop-reporting districts and weighted by irrigated acreage in each district. We had doubts about including these figures because we have been unable to relate them to the annual value of water. In addition to the capitalized value of access to water, the differences reflect variations in quality of land, improvements of land, such as wells on some lands and orchards and vineyards as in California, and differences in expectations of future earnings and rates of capitalization. However, the difference in land value represent a minimum that would need to be paid to irrigation farmers for water rights. A purchaser of such rights would have the additional expense of water tolls and assessment or pumping costs.[10]

The rates charged by the 3 largest municipal supply systems for each of the western water-resource regions are given in Table 3. These rates paid are comparable to rates paid by irrigators, as reported in Table 2. They give little indication of what users would be willing to pay. In the case of domestic users, we know that the demand for water is inelastic over a wide range of prices paid. The U.S. Public Health Service expressed the opinion that even if costs of water were tripled, long-range domestic demand would not be significantly reduced.[11]

The bulk of water used by industry is self-supplied. Costs are not

Colorado Water-Resource Region; the State of Nevada for the Great Basin; New Mexico for the Upper Rio Grande and Pecos; and the Southern Plains Type-of-Farming Area for the Western Gulf Water-Resource Region.

[8] Annual land charges were taken at 5 percent of estimated market value of mean dry cropland for crop-reporting districts, weighted by irrigated acreage. For some arid areas with no dry cropland, land charges were based on value of grazing land. It was reasoned that for future irrigation, dry cropland would be acquired, together with a water supply, and that expansion of irrigated areas by crop-reporting districts will occur more in proportion to current irrigated acreage rather than acreage of dry cropland. A deficiency in this procedure is neglect of quality differences between irrigated and dry cropland. Market values of irrigated and dry cropland were obtained from surveys conducted by William H. Scofield, Farm Econ. Res. Div., ARS.

[9] In some western areas, loss of water supply would render small acreage of previously irrigated land worthless. Accordingly, dryland values were placed at zero for some crop-reporting districts.

[10] Judging from past acquisition of water rights from irrigators, notably in the Owens Valley of California, costs of such acquisitions may well exceed the difference between irrigated and dry cropland values.

[11] U.S. Senate Select Committee on Water Resources, *Future Water Requirements for Municipal Uses*, Comm. Print No. 7, p. 16.

TABLE 3. CHARGES FOR WATER DELIVERED BY PUBLIC SUPPLY SYSTEMS, 1955, AND WATER BILL AS PERCENTAGE OF VALUE ADDED BY SELECTED INDUSTRIES IN 1954 AT ASSUMED COST OF $32.60 PER ACRE-FOOT DELIVERED

Water-resource region	Rates per acre-foot of public supply systems[1]		Industry			
	Small users[2]	Bulk users[3]	Food	Chemical	Pulp and paper	Petroleum and coal
	Dollars	*Dollars*	*Percent*	*Percent*	*Percent*	*Percent*
South Pacific	90.3–108.5	39.1–47.9	0.6	1.1	1.8	5.3
Central Pacific	100.0–143.1	20.9–67.8	0.8	3.1	3.4	7.7
Pacific Northwest	56.4– 74.0	22.5–74.0	1.2	6.4	8.9	[4]
Great Basin	78.2	52.1	.6	[4]	[4]	[4]
Colorado River	87.0–138.2	36.2–56.0	.8	[4]	[4]	[4]
Upper Rio Grande and Pecos	93.5–236.2	55.4–91.2	[4]	[4]	[4]	[4]
Upper Missouri	73.0– 91.2	35.8–40.1	1.8	1.2	[4]	[4]
Upper Arkansas	100.0–194.5	18.9–56.4	1.6	1.7	[4]	1.7
Western Gulf	68.1–139.5	22.5–44.6	.7	[4]	7.6	[4]

[1] Range in rates charged by 3 municipal supply systems distributing the largest quantities of water in each of the regions. "Survey of Operating Data for Water Works, 1955," J. Amer. Waterworks Assoc., Vol. 49, No. 5, May 1957.

[2] Based on rate per 1,000 cubic feet, presumed to apply to household use.

[3] Based on rate per 1,000,000 cubic feet, presumed to apply to industrial and commercial use.

[4] No data.

known, but they have been estimated to range from 5 to 11 cents per 1,000 gallons of intake or about $16 to $36 per acre-foot.[12] Data compiled by the Federal Power Commission for steam electric plants, as well as other evidence, indicate that for large-scale users the costs of water may be considerably below 5 cents per 1,000 gallons.[13]

We attempted to gage the elasticity of the demand for water in industry by comparing the total industrial water bill to value added by industry. In Table 3, the water bill for 4 major water-using industries is expressed as a percentage of value added by the industry in 1954, at an arbitrary unit cost of 10 cents per 1,000 gallons of intake. If water charges had turned out to be a very small fraction of value added for a wide range of assumed unit costs of water, we would have speculated that demand for industrial water may be inelastic, but our results must be considered inconclusive.[14]

[12] Picton, Walter L., *Water Use in the United States 1900-1980,* U.S. Dept. Commerce, Business and Defense Services Administration, March 1960, U.S. Govt. Print. Off., Washington, D.C., p. 5.

[13] *Steam Electric Plant Construction Cost and Annual Production Expenses,* Annual Supplement 1953, F.P.C. S-109.

[14] Such speculation would in any case have been hazardous. To the extent that other factors of production can substitute for water, it is marginal rates of substitution and price ratios that determine industrial demand for water in industry. Even relocation to another site can be regarded as a substitution of other factors for high priced water.

III. *Range in Estimated Repayment Capacity for Irrigation, 1954, and Estimated Cost of Water for Industrial and Domestic Uses, 1955, Compared with Indicators of Future Storage Cost*

We shall now compare the present prices paid for water by different groups and the payment capacity for irrigation with the prospective costs of storage. With nearly full development of the Upper Missouri, we assume that further increments in losses plus amounts needed as flow in the streams will require a corresponding increase in minimum flow.

TABLE 4. RANGE IN ESTIMATED REPAYMENT CAPACITY FOR IRRIGATION, 1954, AND ESTIMATED COST OF WATER FOR INDUSTRIAL AND DOMESTIC USES, 1955

Water-resource region	Per acre-foot delivered for—					
	Irrigation[1]		Industry[2]		Domestic[3]	
	Low	High	Low	High	Low	High
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
South Pacific	13.2	49.5	8.1	47.9	90.3	108.5
Central Pacific	3.1	13.8	8.1	67.8	100.0	143.1
Pacific Northwest	1.4	3.9	8.1	74.0	56.4	74.0
Great Basin	1.0	4.6	8.1	52.1	78.2	78.2
Colorado River	2.1	4.8	8.1	56.0	87.0	138.2
Upper Rio Grande and Pecos	2.5	7.3	8.1	91.2	93.5	236.2
Upper Missouri	1.6	5.9	8.1	40.1	73.0	91.2
Upper Arkansas	1.5	12.1[4]	8.1	56.4	100.0	194.5
Western Gulf	6.9	15.6	8.1	44.6	68.1	139.5

[1] Low estimate equal to mean of upper quartile of rates charged by public irrigation supply system or lowest of 3 Bureau of Reclamation repayment capacity estimates, whichever is lower. Upper estimate equal to 70 percent of imputed returns per acre-foot delivered, or highest of 3 Bureau of Reclamation repayment capacity estimates, whichever is lower. Computed from Table 2.

[2] Low estimate 2.5 cents per 1,000 gallons of intake, based on assumption, no data available. High estimate equal to upper range in public supply rates to bulk users as shown in Table 3.

[3] Range equal to range in supply rates to small users as shown in Table 3.

[4] Median of repayment capacity reported in 3 recent Reclamation projects. Imputed returns not available.

Table 4 summarizes estimated ranges of repayment capacity for irrigation in 1954, and actual cost of water for industrial and domestic uses in 1955. For irrigation, the low point in users' payment capacity per acre-foot is taken as the mean of the upper quartile of rates charged by irrigation supply systems, or the lowest of the 3 repayment capacity figures obtained from the Bureau of Reclamation, whichever was lower. The high point is 70 percent of the imputed marginal returns, or the highest of the Bureau of Reclamation estimates, whichever was lower (Table 2).

For industry, the low estimate in water cost was assumed to be 2.5 cents per 1,000 gallons of intake for all regions. In the absence of actual data, the assumption was made on some fragmentary evidence that the

cost of self-supplied water to large industrial users may be less than 5 cents per 1,000 gallons. The high estimate is the highest rate charged by the 3 largest public supply systems (Table 3). For domestic uses, the range is the same as that in the charges of the public supply systems.

Based on historical flow data, the U.S. Geological Survey[15] estimated the quantity of storage required to raise present low flows to successively higher levels. Costs of storage were estimated from curves relating size of reservoir to costs per acre-foot of capacity by physiographic regions.[16] A schedule of reservoir sites was constructed for each water-resource region that followed roughly the 1954 percentage distribution of reservoirs by size class within each region. It was then possible to combine the varia-

TABLE 5. ESTIMATED STORAGE COSTS OF FLOW REGULATION, UPPER MISSOURI WATER-RESOURCE REGION

Storage added, cumulative total[1]	Annual cost of storage added, cumulative total[2]	Dependable flow, cumulative total[3]	Annual incremental cost per m.g.d. of flow regulation
1,000 acre-feet	*Million dollars*	*Million gallons per day*	*Dollars*
0	0	1,800	—
8,100	9.2	12,500	860
13,500	17.3	16,500	2,025
18,900	27.1	20,500	2,450
23,000	35.2	23,000	3,240
26,700	44.9	25,000	4,850
28,400	50.4	26,000	5,500
29,900	57.2	27,000	6,800
30,000	57.6	27,000	—

[1] Storage added above existing storage for flow regulation.
[2] 6 percent of capital cost to allow for interest, operation and maintenance. Size distribution of reservoirs added assumed to be similar to existing size distribution of reservoirs in region.
[3] Flow available 100 percent of time prior to depleting uses. Based on relationship of regional totals of dependable flow to regulating storage; does not consider flow requirements at specific locations.

tion in yield per acre-foot of storage with the variation in costs per acre-foot of storage capacity into a schedule of costs per increment of flow. Annual costs of interest, amortization, operation, and maintenance were estimated on the assumption that they were equal to 6 percent of capital costs. The results in the form of a schedule of additional storage capacity (above 1954), beginning with the cheapest storage sites and cumulating to the theoretical maximum for complete regulation, are given in Table 5 for the Upper Missouri Water-Resource Region. Flows are prior to depletion by use but after adjustment for reservoir losses. Limitation of

[15] Under the direction of Mr. Roy Oltman.
[16] Developed by Howard Cook of the Corps of Engineers. Cost curves for western regions were developed by Mr. Arnold Babb of the U.S. Bureau of Reclamation. Mr. Cook also prepared a map of the United States showing the physiographic zones into which each water-resource region was divided.

space and time does not permit the presentation of similar relationships available for all water-resource regions.

Comparing Tables 1, 4, and 5, can we say anything about the allocation of water use that would develop in the Upper Missouri if such an allocation were determined by user payments? To begin, it is evident from Table 1 that not all projected uses can be met from regional water supplies.

Further inferences are subject to the limitations that (1) our indicators of repayment willingness are for 1954 rather than 2000, and are not available even for 1954 for some major uses, such as fish and wildlife, (2) repayment is applicable to all costs rather than storage alone, which may be less than 50 percent of the total costs,[17] and (3) our assumption that storage required to regulate flow is an adequate measure of total storage required. This assumption was made for increments in use under conditions of nearly full development of the Upper Missouri.

By use of ground water, we may be able to regularize withdrawals without adding surface storage to the theoretical maximum. But let us speculate about the effects on costs if we should be forced to the final increment of surface flow regulation.

Table 5 shows that the final increment of flow would cost about $6,800 per m.g.d. annually, or about $6 per acre-foot annually. Waste dilution is about three times the intake and depletions are about 20 percent of intake for municipal and manufacturing purposes. This brings storage costs to $\$6 \times 3.2$ acre-feet, or $19.20 per acre-foot of intake. This is about 25 percent of the rates paid in 1954 for domestic use. The $19.20 storage cost would be about 2½ times the present costs incurred by self-supplied large water users, but would be only about half the costs of industrial customers of municipal water systems.

The storage cost of $6 per acre-foot is equal to the upper range of 1954 payment capacity per acre-foot delivered for irrigation and is about four times the lower limit. Payment capacity would be just about the same per acre-foot delivered as depleted.

It seems that cost of storage will not limit future domestic uses of water; it may limit some industrial uses and irrigation.

The Upper Missouri's projected water shortage is in large measure the result of the growth, projected by the U.S. Fish and Wildlife Service, in wetlands to provide for expansion of the waterfowl population proportional to the expected increase in the number of hunters. What may, therefore, turn out to be the critical question is, How much can agricul-

[17] For example, the cost allocated to conservation storage in potential Federal projects in 17 Reclamation States is about 30 percent of total project costs: U.S. Senate Select Committee on Water Resources, *Reclamation in the West, Present and Future and its Effects on Water Supplies,* Tables 5 and 8.

ture afford to pay for water compared with the beneficiaries of wildlife habitat?

We have no answer to this question. Institutional mechanisms within which the demands of outdoor sportsmen for natural habitat function are not yet designed effectively for the acquisition of the quantities of land and water that the projections for the year 2000 imply. Continued rapid growth in camping, fishing, and hunting can affect markedly the pattern of water use in the Upper Missouri. The problem is complicated by the fact that the birds who feed and rest in the North Dakota potholes are likely to serve as sport farther south. Not only is there a question of competition among uses within the Upper Missouri, but there is also the necessity for weighing the interregional distribution of costs and benefits.

The shortcomings of our estimates of storage costs are formidable but no superior treatment seems possible short of locating uses at specific locations, as well as determining time patterns of use. The estimates of capacity to pay for irrigation reflect productivities of recent years and are based on averages that subsume a broad range. The figures for industrial users are little more than assumptions. Nor have we considered the all-important implications of multi-purpose uses. Sharing of joint costs by flow uses such as navigation, hydroelectric power, and fishing habitat may so reduce the charges to irrigation and industrial customers as to bring them within economic range.

But perhaps the most serious limitation is the futility of studying the pricing process as it applies to one factor of production in isolation. It seems that nothing short of analysis of total production costs at alternative locations is required. Our exploration of this possibility led us to the conclusion that such an analysis can at best yield only a general idea of what an economic pattern of future water development might be and the general trends of development that should be encouraged by our public institutions.[18] We are reassured by the recent statement of Professor Wantrup, "The most important decisions in modern land and water policy are of a kind which, as their predictive basis, do not require a high degree of quantification."[19]

Viewing the findings of the Select Committee on Water Resources in the spirit of this quotation, perhaps some generalizations are possible concerning the potential role of pricing and assessment in water allocation. The problems of such market allocation having been discussed else-

[18] "Economic Elements of National and Regional Planning for Development and Use of Water Resources," Paper presented by Karl Gertel at meeting of Missouri Basin Res. and Dev. Council, Kansas City, Kans., Oct. 1959.

[19] Ciriacy-Wantrup, S. V., "Conceptual Problems in Projecting the Demand for Land and Water," Giannini Found. Paper No. 176, Calif. Agr. Expt. Sta., Berkeley, May 1959.

where,[20] we will limit our remarks to what seem to be some major difficulties not necessarily engendered by current laws and institutions but characteristics of the water resource.

Most of our experience with the western water market has been with the transfer of rights to divert or store water from streams. The needs of the future emerge in large measure as uses that require maintenance of stream levels, such as waste dilution, or uses that require that flows do not exceed certain levels, such as flood control. The complications of use of water for expansion of waterfowl population have already been mentioned.

Such uses are frequently joint uses of water, typically extending over wide regions, and require coordinated control of entire river systems. We can conceive of a market for certain uses of water but this market will need to operate in a broader framework of public control. However, to an important degree, user charges and assessments levied by public and quasi-public groups could perform the allocative function of the market.

The massive investments frequently required for developing water resources and the indivisibility of the water resource would make transfers of water from one use to another complex and costly with any legal-institutional arrangement and often imposes an inflexible pattern of water use. The question arises whether in certain water-short regions, a portion of the remaining supply should be reserved for future needs not currently reflected in the market.[21] The price of such action would, of course, be sacrifice of more immediate uses or their possible curtailment by granting water rights restricted in time. It is in such issues that projections of the type developed by the Senate Select Committee on Water Resources can serve us, especially after they are developed in greater detail and combined with interregional analysis.

---

[20] See for example: McPherson, W. K., "Can Water be Allocated by Competitive Prices?" *J. Farm Econ.*, 38:1259, Dec. 1956. The discussion by Krutilla and Eckstein of the need for public participation in water development is particularly pertinent to the problem of market allocation of water: Krutilla, John V., and Eckstein, Otto, *Multiple Purpose River Basin Development*, publ. for Resources for the Future by the Johns Hopkins Press, Baltimore, Md., 1958, pp. 41-49.

[21] For a more detailed discussion of this question see: Wollman, Nathaniel, "Economic Factors in the Study of Water Use," *The Law of Water Allocation in the Eastern United States*, Proc. of a symp. spons. by the Conservation Found., Washington, D.C., Oct. 1956 (Ronald Press, New York) p. 565 (see esp. the conclusions).

LEGAL AND INSTITUTIONAL CONTROLS IN WATER ALLOCATION[1]

STEPHEN C. SMITH[2]
University of California, Berkeley

THE economics of water allocation has a fundamental concern with institutions, whether they are legal or organizational. The rural-urban competition for water expresses itself *through* laws and organizations and *over* the acceptance or rejection of particular ways of doing things. This role of institutions *in* water economics will be developed in section I.

The concept of a water right has an important economic content. For one hundred years, western litigation has been struggling to define rights to water to be consonant with our economic precepts. This definition as it relates to economic change *from rural to urban* water use will be examined in section II.

Economic values and interests are expressed through other institutions than the market. In the western United States, public agencies have performed a major task in organizing water resource development and management—with the private public utility and the mutual company having a foot on both sides. The way in which the economic competition of farm and city is expressed internally within the organization and externally between organizations will be the concern in section III.

The whole paper will deal with the economic institutions of water allocation—in everyday language, the who, the when, the how, and the what of water use. As will become evident, the focus is not upon the word "control" in the title. The meaning of control is not forgotten but implied. A more direct approach to this point would have necessitated a careful discussion about institutions and controls—of necessity this would have meant an examination of other issues such as liberty. Although of interest and importance, it would have been beyond the present scope. Also, emphasis is given to the problems of competition rather than to the many complementarities and the areas of neutrality.

Great diversity exists when one speaks about water rights and organizations. The diversity comes from, first, the variety in the physical and economic context in which water is used throughout the nation. Second, and in partial response to the first, the legal and organizational context

[1] Giannini Foundation Paper No. 197.

[2] The comments of S. V. Ciriacy-Wantrup and Michael F. Brewer are appreciatively acknowledged. Also, discussions with J.C. Spencer and David Sabistan of the State Water Rights Board and Gleason Renoud of the Bureau of Reclamation were helpful.

differs from state to state and from region to region. Because of this diversity, overgeneralization can be very hazardous unless the details are thoroughly in mind. For these reasons, my illustrative material will come from California. By staying within a particular frame of reference, comparison with other situations is facilitated.

I. *Economics in Water Policy*

Why should a discussion of the economics of allocating water between rural and urban uses concern itself with laws and institutions? Why not leave these problems to the lawyer, the political scientist, and the sociologist? Clearly, the content of each of these disciplines has an important contribution to make; yet this does not diminish the significance of laws and institutions for economics. The economist must study them and understand them, because they form both a base for economic decisions as well as constitute the decision-making machinery itself.

The economics of water allocation directly involves questions of public policy—questions of public action—rather than just questions of the market. In saying this, no dichotomy is implied between centralized versus private decision-making or between private property and the market versus administrative and judicial judgment. Such an argument is misleading when applied to the real world of affairs. Private and public decisions are highly interdependent. In fact, the public character of many water decisions is recognized whether they are made by a private individual or an individual acting as an officer of a public organization.

Water rights have been particularly important in the allocation of water. They define property relationships which are basic to both private and public action. But by its very nature, the definition of the types of property rights is a public matter. Also, the creation of organizations to make public investments in water resources is public policy as well as the actions which the agencies take. Public policy is central to water resource economics—whether it is investment policy, water rights policy, organizational policy, or that dealing with one of the many other aspects.

This fact raises a very interesting question with respect to a portion of economics which has proven useful in areas such as benefit-cost analysis; namely, is it appropriate to reason via the application of maximization techniques from given ends, objectives, and goals as the whole criteria of policy analysis.[3] The use of the means-ends scheme in a puzzle-solving fashion for optimization is hardly adequate[4] when the essence of policy is the determination of ends, not having them given. Consequently, the

[3] S. V. Ciriacy-Wantrup, "Concepts Used as Economic Criteria for a System of Water Rights," *Land Economics*, 22:295-312, Nov. 1956.

[4] Paul Streeten, "Introduction," in Gunnar Myrdal's *Value in Social Theory* (New York: Harper & Brothers, 1958), pp. ix-xiv.

focus is upon deciding these ends. For this purpose, an interest in institutions such as laws and organizations is fundamental. Of course, ends may not be decided explicitly in themselves; frequently the issues for decision are a mean with the ends just forthcoming.

Before the decision, there is no one objective but a host of conflicting and competing objectives each put forward by a group or special interest. Public water policy results from this conflict—this lack of harmony. The policy is not given. It is determined by action. Nor are the laws and institutions specified restraints to attain a given objective. They are variables which may be controlled and in turn they exercise strong force to control. They are born, grow, and die with evolution very much in evidence and mutations always a possibility.

The problem immediately arises—how do you study these laws and institutions? What is their relationship to economics? In attacking this problem, the observer economist is concerned with the sequence of action through time[5] and attention must be given to both the formal and informal organization. Such an inquiry carefully attempts to expose the values imbedded within the laws and institutions and to judge their policy impact. The conflicts—conflicts of values—in the situation can be appraised as well as the complementarities. By such examination, the direction[6] of institutional change may be assessed in terms of impending or possible policies.

Of course, the contrast to another type of analysis which allegedly appraises institutions is apparent. An alternate approach suggests that comparing an economic optimization analysis, A, made with one set of institutional assumptions with optimizing solution, B, with another set of institutional assumptions tests whether the institutional structure of A is better or worse than B. Well-conceived analyses of this type have been productive of insight. But they do not ascertain how the institutions worked—particularly how they worked over time. To answer this question, the institutions must be examined directly and not be judged as irrelevant assumptions.[7]

In saying this, it is assumed that the type of organization does influence the outcome; it does influence the values which are represented in the decision-making process. If this were not the case, struggles over organization would be of little point. Using this context for viewing organizations means that the ability to execute or carry out commands is not the

---

[5] Leonard A. Salter, "Cross-Sectional and Case grouping Procedures in Research Analysis," *J. Farm Econ.*, 24:792-805, Nov. 1942.

[6] S. V. Ciriacy-Wantrup, *Resource Conservation, Economics, and Policies* (Berkeley: University of California Press, 1952), 381 p.

[7] Eugene Rotwein, "The Methodology of Positive Economics," *Quar. J. Econ.*, 75:554-75, Nov. 1959. Rotwein argues that assumptions are important.

most fundamental with respect to policy formation although it may play one of the instrumental roles.

One approach recommends that the economist look to the lawyer, the engineer, or others for a determination of policy objectives. But they in turn may look to the economist for guides. And the voter and his representatives may look to each for an indication of what is best—for the norms of their conduct. To reiterate, valuable contributions have come from this approach; but it neglects the essential binding element which relates one action to another action. An interpretation of this point to the effect that I am abandoning ideals, ideas, and leadership would be erroneous. It is this very quality of "institutional leadership"[8] or of "leading ideas"[9] which is omitted by the sharp demarcation of ends and means in the analysis of public policy decision. The question is one of handling values.[10]

A host of conflicting and complementary values have to be considered in the allocation of water between rural and urban uses. These values are incorporated, partially, in the laws and institutions which are used to make decisions. The laws and institutions are objects of value; they are used to represent values in the policy-making process; and they stand for the values which result from the policy decision. In such a situation, a maximization model used as the criteria for judging policy is inappropriate.[11]

The suggestion is to look more carefully at the process of legal and institutional functioning over time. What is the sequence of decision making? What economic interests are in fact expressed in the operations of these institutions? Is the effect, over time, one of inhibiting the transfer of water use to the uses with higher productivities or to uses which are desired?

II. *The Competition for Water Rights*

Western appropriative water rights have been condemned as inhibiting economic change. It has been argued that appropriative water rights, their administration, and their status before the courts are not conducive to having water used according to sound economic standards. It is further

[8] Philip Selznick, *Leadership in Administration* (Evanston, Illinois: Row, Peterson, and Company, 1957), p. 81.

[9] Stephen C. Smith, "The Process of County Planning: A Case Study of Henry County, Indiana," *Land Economics*, 26:162-70, May 1950.

[10] Gunnar Myrdal, *Value in Social Theory* (New York: Harper & Brothers, 1958), 262 p.

[11] Charles E. Lindblom, "Handing of Norms in Policy Analysis," *The Allocation of Economic Resources*, Moses Abramovitz, *et al., eds.* (Stanford: Stanford University Press, 1959), pp. 160-179.

Streeten, *op. cit.*

Ciriacy-Wantrup, "Concepts Used . . .," *op. cit.*

argued that agriculture has a favored legal position which blocks the more productive municipal uses. California laws, organizations, physical setting, and economic history will be examined to understand the effect of water rights in the transfer from agricultural to municipal uses.

As has been pointed out frequently, the early West was an agrarian West. Water was recognized quickly as a key factor limiting economic development, both of agriculture and other segments of the economy. In the turmoil and battles over water allocation,[12] both the appropriate and the riparian doctrines were incorporated into California's law of surface water rights. These battles were physical acts of violence and more enduringly legal and organizational struggles with the establishment of policy as a result. The participants represented, in large part, an economic motivation which was expressed in accordance with our institutions of property. Private initiative was given an opportunity to develop the resource with economic and political power playing an important role.

Competition for water existed even during the first 50 years of development following 1850. But for the most part, the competition was miner against miner, miner against farmer, and farmer against farmer, with only occasional rural-urban conflict. However, after the turn of the century, rural-urban competition did flare behind the Sierra. The voters of Los Angeles in their quest to establish a firm economic base voted in 1905 a $1,500,000 bond issue to purchase water rights in the agricultural Owens Valley.[13] This famous episode of water history was filled with violence and resentment which still lives in areas of origin.[14] Even so, the rural-urban transfer was made at the source of the physical supply.

The basic nature of water rights as real property is illustrated by this case. The effort which has gone into establishing this legal and economic institution has resulted in definitions which permit economic transfer to take place. Of course, land must be purchased for the acquisition of riparian rights. But appropriative rights, under California law, may be severed from the land in a manner similar to other estates in real property; namely, by written agreement.[15] And riparian rights as a matter of

[12] There are many fascinating stories concerning water in western development. To see how the struggle for water played an important role in one man's career, see the biography of Henry Miller (Miller and Lux) as told by Edward F. Treadwell, *The Cattle King* (Boston: Christopher Publ. House, 1950, rev. ed.), 375 p. It was in Lux *vs.* Haggin that the appropriation doctrine became imbedded in California's law of water rights.

[13] Vincent Ostrom, *Water and Politics* (Los Angeles: The Haynes Foundation, 1953), p. 54.

[14] An area of origin is the portion of the watershed containing the source of headwaters of a stream system.

[15] Wells Hutchins, *The California Law of Water Rights* (Sacramento: State Print. Off., 1956), p. 127.

practice are subject to a greater degree of definition than the classical statement of the doctrine might imply. Appropriators, would-be preemptors, and other riparians keep a careful watch on each other; and these rights are quantitatively defined following an adjudication.

Although not common—this will be explained in a few moments—there are a few cases of water rights transfer from agriculture to municipal[16] and industrial and even from power to agriculture.[17] But these are largely of a minor and incidental character. More prevalent has been the transfer and also abandonment of old mining water rights to more productive uses.

And of course, as one water organization became inefficient and outmoded, a more productive system has purchased the old organization. The servicing of more productive uses also can be seen in the supersession from individual diverters of surface flow, to ditch company, to large district. Frequently, this chain of events has involved the transfer of water rights with the result of increased productivity. In a very real sense, the successful operations of the early enterprises laid the foundation for later expansion—for the development of more expensive and more productive water. But with the exception of Los Angeles in the Owens Valley area, I have come across no major direct transfer of surface water rights from agriculture to municipal uses.

Another major transfer is relevant although it is not of the preceding type. The water right purchase and exchange agreement between the United States government and Miller and Lux was a key to a large-scale redistribution system of the Central Valley Project.[18] The private interests were paid $2,450,000 plus a specified annual delivery of exchange water. One result of the program following this transaction was to forestall the use of certain potential dam sites by the City of Fresno. This is a complicated case and will be discussed in two other connections. The point to note in the immediate context is that a transfer did take place.

San Francisco and the East Bay communities, likewise, built aqueducts to tap the water originating in the snow pack on the high Sierra. Although they were involved in water rights issues, the rural-urban conflict was not as intense as for Los Angeles.[19] But what of the expanding suburbia in these and other areas—urbanism has made many frontal attacks

[16] Application No. 10011, Permit 5685, License 2581, Gaston and Urrutia, City of Portola.

[17] Application No. 8496, Graeagle Land and Water Company—8495.

[18] Clair Engle, *Central Valley Project Documents: Part 2, Operating Documents* (Washington: Govt. Print. Off., 1957), p. 577.

[19] San Francisco first applied to build dams in Yosemite National Park in 1901. Permission was not granted until passage of the Raker Act in 1913. Under this act they agreed to release water to the prior rights of the Turlock and Modesto irrigation districts.

upon irrigated agricultural land. Land transfer has been taking place at a rapid rate throughout the state. The pressure of this transfer from rural to urban use has not focused upon appropriative water rights as a major issue although a few warning cases should not be ignored.

One way in which this competition takes place is for the urban community to expand into an irrigation district. With this urban expansion, the purpose of water use has changed with the urbanite relying on the same source. In terms of volume of water, little change is evidenced. If anything, "the average" acre of urban use, at present levels of prices and assessments, demands somewhat less volume of water than an acre devoted to agriculture. The term "water requirement" is used frequently in this context with very misleading results since the relationships of price and social pressure are not taken into account.

The "new" urban demand has not called for supplying additional acre-feet of water nor has the appropriative right inhibited change. The shift may call, however, for an examination of the wording on the water right. Until this year an application could only be issued to one major use, but secondary uses could be included; for example, irrigation, domestic, industrial, recreation. Currently an application can be issued with more than one major use so long as one is not consumptive and the other nonconsumptive.[20] Thus, a change in use may mean that no water rights issue will be raised. At most the application will have to be amended to change the purpose of use. Since the rural-urban shift is from a highly consumptive use to a relatively nonconsumptive use, problems have not frequently arisen although in terms of processing they are handled as a new application.

One reason why urban expansion, in California, has not resulted in mass rural-urban competition for surface water rights is the relationship of the ground water reservoirs. Before elaborating on this point, a third legal doctrine should be introduced—the correlative rights doctrine.[21] This variation of the riparian principle has been applied to ground water by California courts since 1902.[22] Accordingly, the overlying landowner has a coequal right to beneficial use of the water in the underground reservoir. Agriculture in many parts of the state has developed on this base. Municipalities have used the same sources, but their rights are technically appropriative.

To illustrate the rural-urban relationship, the irrigated agricultural area surrounding many cities depends or depended primarily upon ground water. As the city expands into the irrigated areas, the farm wells are

[20] California, State Water Rights Board, *Rules, Regulations, and Information in California* (Sacramento: State Print. Off., 1960), 58 p.

[21] Hutchins, *op. cit.*

[22] Katz *vs.* Walkinshaw, 141 Calif. 116, 70 Pac. 663 (1902); 74 Pac. 766 (1903).

abandoned and municipal service is supplied by a large utility district or the city using surface sources. The ground water basin may be left to the remaining irrigating farmers or large municipal wells may eventually be used with the large district initiating a program of integrated surface-ground water management. Such a solution, of course, depends upon the feasibility of developing additional surface water for municipal use.

The regime of water development and management in other localities is quite different and in a sense the situations are reversed. The irrigating farmers have developed the surface sources—and where possible, ground water—while the cities provide municipal service from well fields. The rural-urban competition centers upon the ground water reservoir for many farmers rely on both sources. But until recently, the competition has not come to a focus on a surface water rights issue. The traditional pattern again has been to develop new surface sources for municipal use and in certain cases to integrate the management of surface and ground water. For example, in the southern costal plain, many areas were annexed to the City of Los Angeles in earlier times; and the more recent history has been for them to join the Metropolitan Water District and use Colorado River Water. In the latter case, the rural-urban competition has not been over surface water rights in California but between the metropolitan region of the southern coastal plan and the proposed development of central Arizona. At least initially, Arizona's main water use would be agricultural.

Under California's correlative rights doctrine, no quantity definition is given to the right.[23] However, if one pumper interferes with the ability of other pumpers to produce water and if this interference can be proven in court, injunctive relief may be obtained which would limit to specific volumes of water the defendant's pumping rights. Predominantly rural interests have used this method to limit urban competitive pumping.[24] Legally proving damage, however, is often very difficult and the process is usually lengthy and expensive. When this type of competition is "solved" by water importation, the question immediately arises of integrating the management of surface and ground water. Interesting research questions wait to be answered in this area. Organizationally, the public district has been used successfully to fill a governmental vacuum.[25]

California's county and watershed of origin laws also bear on this area

[23] All ground water rights may be defined if the basin is adjudicated and rights have become mutually prescriptive.

[24] Mt. Eden Township County Water District *vs.* City of Hayward, 218 Calif. 634. Orange County Water District *vs.* City of Riverside, City of Colton, City of San Bernardino, and City of Redlands, Civil No. 5717, filed August 20, 1959.

[25] Stephen C. Smith, "Problems in the Use of the Public District for Ground Water Management," *Land Economics*, 32:259-69, Aug. 1956.

Stephen C. Smith, "The Role of the Public District in the Integrated Management of Ground and Surface Water," *Water Resources and Economic Development*

of conflict. In large part, the support for these laws has come from rural areas fearing a repeat of Los Angeles' reach into Owens Valley. But this has been only part of the motivation. Smaller urban communities and agricultural communities hope that by limiting the physical transfer of water from their region, the total growth within the state will continue unabated but will be directed to their locality because of the availability of water. In this case, the conflict is mainly over the expectations of future urban growth. Of course, such expectations are subject to a great amount of uncertainty which would argue for working out organizational procedures to take it into account. Toward this end, areas of origin bargain for assurance of retaining specified flows and assistance for development.

For the future, the competitive focus upon water rights will be different. Vested rights can be transferred through established procedures with municipalities holding the right of eminent domain as a last resort. The big shift will center the competition to interagency or intraagency conflicts.[26] To a degree water rights issues will be involved but the main focal point will be over the terms of organization to be discussed in section III.

Two items should be mentioned, however, in the emerging pattern of interagency conflict with a water rights component. The state can and has filed for specified quantities of water as can other corporate entitles. This practice was begun on a large scale in 1927 in anticipation of a Central Valley project.[27] But there is a great difference between these state filings and other filings—the state is not held to the requirement of due diligence in perfecting its right. These rights are kept until someone wants to use them in accordance with the over-all plan.

At times the state takes the initiative in filing; at other times it may be done upon request and with consultation of local groups. When the rights are to be used, the state assigns the filing to the party in question. For example, part of the rights held by the United States government have been assigned by the state and perfected by the federal government. In other cases, the rights are released in favor of filings of others who propose a development at variance with the state application but which would nevertheless serve the general purpose of the state filing. With an assignment, priority runs from the date of state filing; with a release, priority runs from the date of the developer's application. The state merely agrees not to assert its earlier priority against it. Thus, the state can be in an important controlling position in water project development by the use of this power.

To date, one important rural-urban conflict has resulted from this

of the West: Ground Water Economics and the Law (Berkeley: 1956), pp. 81-91. (Report No. 5, Conf. Proc. of the Comm. on the Economics of Water Resources Development.)

[26] Wells A. Hutchins also has stressed the future importance of organizations.

[27] Now in the California Water Code as Division 6, Part 2, Sec. 10500-10507.

process. The California Water Code says that applications of municipalities for domestic purposes shall be "first in right, irrespective of whether they are first in time."[28] However, last year the State Water Rights Board denied the 1931 application of the City of Fresno in favor of an assignment to the Bureau of Reclamation with its priority date of 1927.[29] The basis for this action was a requirement of public interest and Section 10500 of the Water Code.[30] The maintenance of the large, predominantly agricultural Central Valley Project was to the greater public interest than granting a right to the City of Fresno. Yet, the city is not left without the ability to obtain water necessary for its future growth, as will be shown. This case has not run the gauntlet of courts, but its force will be to give the large water agencies the responsibility for providing all of the public with water.

The conclusion from these experiences is that water rights have not been a material block in the economic change from rural to urban water use.

III. *Competition Through and Over Organization*

The role of organizations is increasingly important in dealing with the rural-urban competition for water. Economic interests in water have organized public agencies to which they are internal and which will represent their interests. The organization deals with the internal interests as constituents and represents these interests to external interests.[31] The dominant types of organization operating within the state are various types of governments: public districts, cities, state, and federal. Of lesser significance are mutual and private water companies.

The successful use of public districts dates back to the passage of the Wright Act in 1887 which combined the powers of bond issuance with the assessment of an ad valorem levy on real property.[32] Upon this basis, the irrigation district movement[33] and the use of other forms of water districts grew. In a very important way, these districts filled a governmental and organizational vacuum to accomplish water development for both agriculture and industry.

Both large and small cities, as municipal corporations, have provided

---

[28] California, *Water Code*, Sec. 1460.

[29] California, State Water Rights Board, Decision D 935, June 2, 1959, 109 p.

[30] California, *Water Code*, Sec. 10500, "Applications filed pursuant to this part shall have priority, as of the date of filing, over any application made and filed subsequent thereto." Inasmuch as Sec. 10500 was enacted after Sec. 1460, it is held to be controlling.

[31] Smith, "The Role of the Public District . . .," *op. cit.*

[32] The 1909 statutes restricted the application of the levy by irrigation districts to the value of land less improvement.

[33] To my knowledge, Frank Adams was the first to use this term. Frank Adams, *Irrigation Districts in California* (Sacramento: State Print. Off., 1929), p. 32. (State Department of Public Works Bulletin No. 21.)

water service. Their activities have varied from operating well fields to transporting water from one region of the state to another as in the case of San Francisco and Los Angeles.

The state government has been active in the areas of developing working rules and governmental machinery, of planning and studying water resources, but not in the actual operation of facilities. The future role of the state as an operating agency is currently a matter of policy debate in California with the voters deciding in November whether or not they favor a $1,750,000,000 general obligation bond issue for water development.

The federal government is best known for the construction and operation of the Central Valley Project. But other projects of less magnitude have been built by both the Bureau of Reclamation and the Corps of Engineers. The local area of activity, however, has not been taken over by federal investment or employees. Local districts act as contracting parties to distribute water to the consumer and to maintain certain types of facilities. In more recent years, the Soil Consevation Service has been active in watershed development under Public Law 566.

Each of these types of organizations is a legal entity capable of owning property and making contracts. One of the most important forms of property rights held by these groups is their water rights. This is the case whether it is a local district or the federal government. In fact, the appropriations for the largest volumes of water are held by these organizations. Thus, much of the rural-urban competition for water is increasingly being evidenced through the activities of these organizations—either internal competition or interagency competition.

Internal competition may focus upon either the plan for action or upon the terms of organization. It may take place during the formal actions of creating the organization or through the continual process of organizational adaptation which is necessary for viability over time. In either case, basic decisions concerning who will get the water are made during these periods of organization rather than in a market context.

Conflicts over plans for water development have been frequent and the center of much public debate. In fact, our techniques for project evaluation have been directed toward these problems. Organizationally, the question of boundary of authority and service area are closely related to the plan and are of particular note. The boundary question becomes significant since it relates, in part, the incidence of cost with the incidence of benefits. This very issue is paramount in the current discussion of the California Water Plan. For example, the proposed state general obligation bonds are secured partially by the economic capacities of the cities of San Francisco and Los Angeles. But some voices in these cities would rather they were not included since each has alternate water supplies. In fact, Los Angeles may be included in a contracting district yet receive

little water. This over-all situation is not completely a rural-urban split, but these differences are involved because of the large volumes of water which will be used for irrigation in the San Joaquin Valley. Yet, without the broad security, serious problems would arise with the sale of bonds. These conflicts are internal to the organizing process. Similar types of issues have been significant in the creation of many districts. In these cases, a common practice is to prepare for discussion a plan with boundary. If this proves unacceptable to the constituents, incremental changes are made in the plan and boundary followed by a new try. The choice is one at a time over time. Where the service area is substantially smaller than the area of authority, those outside the service area focus attention upon the economic evaluation of the plan and the financial feasibility of the service area bearing the costs. Competent economic evaluation and financial feasibility studies would do much to answer legitimate questions of inquiry. Ideally, such economic studies should be built into each step of the planning process. In this way, substance could be given to the administrative declarations concerning relationships such as prices covering bond repayment, operating costs, or contract obligations.

Rural-urban competition for water is evidenced *through* public organization, but our concern at this point is the conflict *over* the terms of organization. These terms specify relationships of one internal constituent to another, internal to external interests, as well as the relationship of the constituent to the service rendered. To the extent that rural and urban interests are competitive, disagreements often arise over the nature of the repayment plan, method and level of service charges, the procedures through which the project is controlled, and the ability to incorporate new values into the organizational structure over time. These are all terms which have been points of conflict in the past and will undoubtedly continue into the future.

Time does not permit a discussion of each of these issues, but let me illustrate the way the competitive process takes place. Over 30 years ago, the urban residents of Santa Clara County refused to accept an assessment upon buildings to help pay for a ground water recharge program which would benefit both city and farm. The term agreed to assessed land exclusive of improvements.

When the terms of organization call for water charges to be based upon cost, competition centers upon the methods of allocating costs. For example, under some circumstances the separable cost remaining benefit method is *more* favorable to agriculture relative to urban areas than the proportional use of facilities method.[34] The method selected will often be the result of behind the scenes bargaining procedure rather than an open

[34] Michael F. Brewer currently is studying this problem in connection with the proposed Southern Aqueduct System of the California Water Plan.

discussion of the real issue. Economically, the argument over this term of organization is an argument over the pricing complex for water.

Over time the character of the organization's constituents may change and demand a different set of services. As previously noted, districts supplying irrigation water have been encroached upon by the growing suburbia. This transition may be evidenced in control of the boards of directors and in the package of services provided. Boards of directors cease to be composed of farm businessmen but are replaced by urban businessmen. New interests may become evident or a necessity. Public health standards must be met, new recreational pressures may be generated, and the standards of water quality may be quite different. Irrigation and industrial water are not the same. In addition, the spreading of housing developments over the valley floors frequently create serious flood and drainage problems previously nonexistent. These new interests may attempt to find representation through the old organization. Failing this, representation is sought through a new or different organization with the result of interorganizational conflict often involving the same assessment base.

As large interregional transfer agencies become more dominant, the pertinent questions become ones of internal policy. In the conflict between the City of Fresno and the United States government, the municipal uses of the City of Fresno were subordinated to the large investment in the predominantly agricultural interests of the Central Valley Project. Yet, the city is not left dry. Rather than the water right which it would prefer, a contract with the Bureau of Reclamation probably will be required. Since the primary mission of the Bureau of Reclamation as stated in the 1939 Act and elsewhere has been to promote an irrigated agriculture,[35] you could argue that such a ruling by the State Water Rights Board might be standing in the way of the transfer of water to a use with a greater productivity. On the other hand, it can be argued that a recognition of public responsibility has been given to the large organization which is carrying on the program of interregional transfer. Likewise, in other localities where other large organizations are developing water, they also will be forced in the future to accept this public interest of water supply.

The Central Valley Project has assumed responsibility to transport municipal and industrial water since its inception, with the first water being delivered through the Contra Costa Canal in 1940.[36] Pressures to

---

[35] U. S. Dept. Interior, *Federal Reclamation Laws Annotated* (Washington: Govt. Print. Off., 1958), vol. 1, p. 598.

[36] Smaller projects in the same Bureau of Reclamation region in California also provide municipal service; for example, the Cacuma Project will service Santa Barbara.

expand this type of service may well increase so that greater recognition will have to be given to this role in all Bureau of Reclamation activities. This same role is being taken in the proposed Feather River Project with municipal and industrial service receiving major attention in all considerations—from design to financing.

A greater shift in this direction will have a significant impact upon the organizational structure used to represent these new interests. The water right will be held by the large organization,[37] with the service contract being a point of prime interest. These water service contracts are basic to investment programs by the water users. The contracts and investment programs become interdependent since the asset markets are characterized with numerous imperfections. Our interest at the moment is not upon this aspect but upon the structural impediments to changing these contractual relationships. Economic conditions change. "Revolutions" of many kinds may take place within the span of four decades. Towns grow; technology changes; economics is dynamic. These and other factors may affect the demand for water. In view of this dynamic character of the economy, should not such practices as subcontracting or the purchasing of contracts be explored as avenues to maintain elements of flexibility within the organization as well as the ability to renegotiate specific terms. Such flexibility may result in developmental economies due to better asset utilization.

The use of organizations to "produce" water raises a question which is always present but is handled differently when dealing with property relationships rather than with organizations—namely, integrity and competence of management. Of course, these elements are important to other subjects than the rural-urban competition for water; but their importance here is not insignificant. Does the planning and development process insure that all facets of the problem are considered—not only the immediate partisan interests which have the power to be heard in any event but the public whose voice is less articulate? An insistence upon professional standards may assist in this process. Of course, the granting of responsibility to act with a clear line of public accountability can be helpful to maintain integrity.

For the future, rural-urban competition will be expressed through and over the institutions of water organization. Ingenuity and insight based upon research will be required to provide avenues for water interests to express themselves in water organizations.

---

[37] An unsettled point is whether the water right license will be held by the water user or the organization. Conditions in the permit state the water users will hold the license. However, a final verdict will not be rendered until they are issued and tested in court.

DISCUSSION: RURAL-URBAN COMPETITION FOR WATER

DAVID J. ALLEE*
Cornell University

Gertel and Wollman set for themselves a classic economic task. They ask what would the world be like if it played the economic game according to one of the schemes economists have made for it.

They start with a purpose of building up an allocation of water that would represent an optimum based upon market criteria. But current payments paid do not represent the results of free market equilibria and the coefficients to determine future opportunity costs are lacking. Thus their purpose can be restated as "public subsidies and allocations aside, would there be takers at present prices for the water that is likely to be developed in the next few decades." For those with projects to plan and approve, where legislative mandates include differing amounts of subsidy for different users, this will provide some overall perspective in the bargaining sessions for particular projects with particular demand and supply complexes.

As a starting place they suggest the physical quantities in Table 1. But what sort of projection of the pattern of water use in the year 2000 is Table 1? It at least suggests some directional changes, but within the qualifications placed on the Table by the authors, and within the limitations of the original studies. The bases for the individual type-of-use projections differ greatly in spite of the use of the same population and income projections. Some are more cognizant of where the use in question stands in terms of achieving the projections made.[1] Others represent quite optimistic goals really set out as targets.[2] Our authors have made

* I ame indebted to Howard E. Conklin for his suggestions.

[1] The major portion of the agricultural requirement is a projection of irrigation. The basis of this projection is the demand for food. The actual projection is made by asking the question, "How much water would be used if food requirements for the year 2000 were met from changes in land use"? Possible shifts of land from forest to pasture, pasture to crops, crops to irrigated crops, etc., are worked out for each region. Estimates of the need for supplemental moisture adjusted for availability of water, recovery of losses, efficiency changes in water distribution, losses in storage and the like allow a computation of water required. The original report points out that this projection is unlikely to occur at present price ratios, and that price ratios which will bring forth this production are likely to produce changes other than the shifts in land use on which the projection is based: Senate Select Committee on National Water Resources, *Land and Water Potentials and Future Requirement for Water*, Print No. 12, USGPO, Washington, D. C., 1960, especially page 2. Speculation has been advanced elsewhere on the problem of price ratios calling for a relative flow of resources to agriculture rather than away from it. For example see W. W. Cochrane, "Farm Technology, Foreign Surplus Disposal and Domestic Supply Control," *J. Farm Econ.*, Dec. 1959, pp. 85-99.

[2] It is estimated by the Fish and Wildlife Service that the demand for duck hunting will double by 2000, thus "It is assumed that habitat and water requirements

some adjustments to bring these independently prepared estimates to a more common footing. But the criteria by which they feel Table 1 to be even a rough approximation of the results of an "efficient allocation of economic activities" at present costs of water is not clear.

In the nine regions evaluated by the authors, agriculture is the established water user, still ranking first or second by the year 2000 in aggregate requirement in spite of declines expected in five of these regions. The rest are expected to expand strongly. Waste dilution is the next most important; fish and wildlife habitat consistently ranks about third; mining and manufacture, thermal power and municipal requirements taken as a group come fourth. Agriculture, as the established use, will be under pressure from the others, so much is clear. Undeveloped supplies will be under pressure from all uses, but it is not clear that Table 1 indicates very much about "the resolution of competition for limited water resources."

The direct user payments brings us closer to an answer. The low estimate presented in Table 4 for what irrigators were willing to pay would seem to be the most realistic.[3] But the high estimate may better represent what someone has been willing to invest on an annual basis to provide water to irrigators; and it is probably somewhat under what irrigators are likely to be paid to give up their water.

The range for industrial users in Table 4 is now at a level two to five times the level of irrigation, and may be on the low side of the "what will they pay" figure, due to historical values distorted by subsequent inflation and due to municipal subsidization of industrial water supplies. Domestic use payments are now two to ten times the industrial level and, as the authors indicate, are the low side of what might be used to deliver water supplies for domestic use. Apparently in the institutional allocation of water, market-based arguments, if not the market itself, should secure water for the fourth-ranked user relative to the first. In none of the nine regions does the sum of the projections for the first and the fourth type-of-use groups come too close to the average flow or, alternatively, result in more pressure on it than exists today.

But what about the uses for which there are no direct user payments–

---

must be expanded accordingly." Senate Select Committee on National Water Resources, *Fish and Wildlife and Water Resources*, Print No. 18, USGPO, Washington, D. C., 1960, p. 44. The clear implication is that another 46 to 74 million acres of land are to be converted from dry lands to wet, apparently on a one-for-one basis to what is in a region now. This prospect staggers the imagination. Improvement of present habitat will surely be an alternative. And the intractable problem remains of appraising this quantity of duck hunting versus the alternative use of the resources it represents.

[3] See H. E. Selby, "A Method of Determining Feasible Irrigation Payments," *J. Farm Econ.*, Aug., 1942, pp. 637-46.

wildlife and waste dilution? No recreationist, conservationist or public health official should be surprised at an analysis that shows the conflict for water to be between those who can express their demands in market terms and those who cannot. But political decisions express the willingness of the public to pay for water resource development. And this is of course particularly true of these uses, which represent the bulk of the changes depicted in Table 1.

I am completely in agreement with Smith's desire to emphasize water resource economics as the study of political economy rather than market economy. As economists we are often asked to construct idealized efficiency standards based on market criterion. But his desire to break away from the partiality of our profession for the application of maximization techniques to any and every sort of analysis has my sympathy. Policy analysis is to a large degree the study of the engineering of consent. Values can be indicators of change. But a value alone is like the direction of a vector, without a specification of its velocity and its acceleration. Thus, the process he describes for predictive analysis might include what policy alternatives are open to accommodate a value within policy change, and some relative indication of the pressure it exerts on the decision makers at the time of decision. With this carried out for each value "vector," the policy modification which is the "resultant" may be indicated.

A relevant question will often be, do present institutions facilitate or hinder the bargaining and compromise of conflicting interests? It seems apparent that in New York, at least, the ability to bring together all parties who have an interest in a given supply early in the acquisition process will be critical. It may have more to do with the share of water irrigators are able to secure than anything else. They represent a new type of use looking for un-used cheap water. As individuals they can act without attracting much attention but they can't get far as individuals. A group, however, attracts attention. Under New York laws it must secure a permit,[4] granted through a process of hearings, and satisfy several criteria including that of public interest. Few compromises come out of hearings, and irrigators will not be strong enough to win many public fights. We anticipate that no major projects, nor many small impoundments, for irrigation, will be built in New York except as parts of multiple purpose projects where new benefits and compensatory benefits are also produced for other water uses as well.

The preponderance of water use in New York is by industry. Yet because of accidents of location and differing time and space characteristics in their use and supply pattern, irrigators are not as likely to come

[4] No water rights, per se, attach to the permit.

into direct conflict with industry at the project level as one would expect. However, at the State policy level representatives of industry seek guarantees that expansion of irrigation will not unfairly jeopardize their position. Irrigators at the project level are more likely to come in conflict with wildlife and outdoor recreation interests—the only major water-use interests that share agriculture's concern with the open countryside and interests—that have only recently become established institutionally. But farmers tend to control the local situations. The way seems open for farmers and conservation-recreationists to come to terms. Farmers might offer to accept controls that will balance power at the local level in return for State level policy that will facilitate irrigation. However, one bitter, hard fought, public contest between irrigators and any other interest is likely to solidify positions in such a way as to preclude any such compromise.

Some say New York's riparian doctrine hinders the consumptive use of water, and that this is irrational in a region that is hardly short of water physically. The riparian doctrine does stress continued flow, but the doctrine is changing. New York courts seem to be turning to highest average benefit among riparians as a criterion for lawful use. Still this will only give the individual security in his water supply relative to existing users. But for a group of irrigators it would probably be not too difficult to obtain collective security by easement acquisition. And increased protection against new uses could be provided through a State board operating within the riparian doctrine. The high degree of organization and administration within the appropriation doctrine in Calfornia has and will allow re-allocations to emerging uses. Organization and administration within the riparian doctrine are probably no less feasible, but simply not as necessary, yet, under New York conditions. The need will come, however. The "terms of organization" spelled out by Smith would seem to be as much the elements of conflict in this development in New York as in California.

If one takes as a model of growth the description of the hypothetical "Great Basin" by Krutilla and Eckstein,[5] New York is still at the stage where the bulk of development is by individuals, firms and municipalities. The process of organizational consolidation and public intervention is well under way, however. California is obviously in the mature stages, where public planning, regulation and direct development must be basin-wide and even inter-basin. As an institutional model, to supplement Smith's value analysis suggestion, the complementary merger of the concepts of enterprise and bureaucracy put forward by Dimock should be

[5] J. V. Krutilla and Otto Eckstein, *Multiple Purpose River Development*, Resources for the Future and Johns Hopkins Press, Baltimore, 1958, pp. 4-10.

considered.[6] His analysis allows an ordering of the roles of local organizations and the State in regulation, advisory services, direct development and operation. Add to this some of the insights to group and individual action provided by sociology, plus the concepts of an organization like those suggested by Boulding,[7] and fairly useful work can result. It may not look much like economics to some but it explains the allocation of water as it actually happens.

[6] M. E. Dimock, *Administrative Vitality*, Harper, New York, esp. pp. 1-2 and part IV.

[7] K. E. Boulding, *The Skills of the Economist*, Howard Allen, Inc., Cleveland, 1958, esp. Chapter III, "Organization and Communication."

DISCUSSION: RURAL-URBAN COMPETITION FOR WATER

MASON GAFFNEY
University of Missouri

Ten years ago a Presidential Commission created a stir with the statement that water productivity might sometimes be 50 times higher in industry than in agriculture. If this were generally true, and applied to marginal as well as average productivity, it would certainly dominate any discussion of rural-urban competition for water. It is significant that neither paper develops such a theme. Most cities have good access to water. I applaud and second Dr. Smith's point that most water conflicts which are heralded as rural-urban struggles are basically interregional ones.

Thus in the celebrated dessication of Owens Valley it was not the farmers who warred on Los Angeles, which had requited them handsomely. It was the urban landholders of Bishop who demanded compensation for loss of their trade, the secondary benefit of irrigated agriculture, which moved South along with Owens water. Much of the water went to promote farming in Los Angeles' trade territory.

I feel more reservations about Dr. Smith's thesis that "the big shift will center the competition to inter- or intra-agency conflicts." My reservations are:

1. The earliest irrigation districts have included cities from 1887, and have presided over serving their growing needs ever since. Rural-urban water allocations made inside this sort of administrative framework are not a new development.

2. The big interregional transfer agencies are developing only new waters, large in volume but marginal in value F.O.B. their sources. The sacred waters of high location value flow on as of yore under ancient and honorable priorities, unvexed by any administrative control, often unvexed to the sea.

3. The internal decision-making machinery of interregional agencies has little influence on policies, which are set and often applied to individual decisions by ultimate power centers in the State assembly, the courts, the Water Rights Board, and (on Federal projects) the Congress. Basic allocation decisions are interregional compromises battled out in the unreapportioned, gerrymandered legislature. California courts, for their part, seem disposed to treat interregional aqueducts as natural watercourses on which customers establish vested rights on the old pattern.The Water Rights Board shares this viewpoint.

4. Postwar years have witnessed a strong resurgence of localism, with the Bureau of Reclamation sharply chastened and reduced to an agency for administering court orders. The modicum of short-run administrative flexibility achieved along the Friant-Kern Canal is a pale reflection indeed of the Bureau's onetime aspirations. These, in turn, were less ambitious than the State plan of the early 'twenties which envisioned a completely integrated administration of all Central Valley waters including even the untouchable Tuolumne, Kaweah, and Kern Rivers.

With these reservations, Dr. Smith is still correct that the growth of large agencies is an important change. I would emphasize the increased control exercised, not by administrative machinery, but by the legislature and Congress. This change presages a relative weakening of established cities in competing for undeveloped water. Previously the big cities had an effective monopoly of interregional transfers because of the high capital cost and long deferral of benefits, which farm finances could not bear. This made for an aggrandizement of established urban nuclei which imported remote waters to develop their dependent trade territories. But now State and Federal agencies are transferring remote waters to less wealthy fringe and rural areas, which should lead toward some decentralization of economic growth in California.

My third reaction to Dr. Smith's paper is that it accords the *status quo* more sympathy than it merits. He raises the question whether institutions inhibit water transfers, and in several passages registers substantial satisfaction with their performance. Volumes could be written on the diseconomies inherent in our water institutions; here I will mention a few peculiar to rural-urban competition.

Cities grow out scatterwise. They claim water to serve the actual growth *plus* the undeveloped lands within some outer boundary of growth *plus* a comfortable surplus to cover all conceivable safety factors and to signalize their great expectations of destiny and adorn them with conspicuous waste. Thus they preempt water from agriculture and lesser cities long before they can use it. The law smiles on this, authorizing cities to appropriate waters for hopeful future growth and to jump the

unworked claims of farmers who are up to the same game but lack the finances to begin developing factitious "uses" so far ahead of need.

This would be bad enough, but worse, the waters that cities reach for first are not those that social economy would prescribe. Ideally they should use first the waters most convenient to them, and least so to others. But our water law, which grants rights of use free of charge to the first comer, sets up a reverse incentive, a sort of principle of comparative disadvantage. The handier water is to others, the more urgent it is for you to capture it now, preclusively, while the getting is good. Local waters you keep in mothballs for the 21st century. Neither extravagance costs you nearly as much as it does society, for the State grants you the use— or the disuse—of its valuable waters free of any charge.

Meantime urban settlement expands beyond the bounds of established water service agencies so that new agencies arise to develop new waters, again laying claim, if they can, to enough water for ultimate full development.

The result is urban preemption of waters that is premature by whole generations. I offer San Francisco as a horrible example. She reached out early for the Tuolumne River, which is 170 miles from home with a significant vector in the direction of Los Angeles. Her filings date from the first years of the century, but the waters never reached her until 1934. At this point she put many of her local sources on standby, where they remain today. The city's own water use now, some 60 years after the Tuolumne filings, falls short of the mean annual flows of her fully-owned local sources in Alameda and San Mateo Counties, not to speak of untapped sources nearby in Santa Cruz, Marin, Sonoma and Mendocino Counties.

On the Tuolumne San Francisco claims 400 million gallons a day (mgd), of which she has installed capacity for 160 mgd and actually takes about 120 mgd (74 mgd inside the city and 47 mgd outside.) She left valuable power drops unexploited until 1956, and acted then only when faced with their imminent loss. She blocks every move to transfer surplus Tuolumne waters southeast toward areas of shortage. The waters that do flow through her Hetch Hetchy aqueduct run counter to the general Statewide need for southeasterly movement of water and must be offset by costly reverse transfers by other agencies. All in all one finds here precious little net contribution to human welfare.

Turning to the paper of Gertel and Wollman, the authors have already catalogued its shortcomings far beyond my poor power to add or to detract. They present some important and interesting data which I hope they may have future opportunities to synthesize a little more tightly. I suspect that what they very modestly describe as the shambles of their

failure may have greater salvage value than they have yet taken from it, if they would reconcile themselves to the necessity for drawing the most valid inferences one can from unsatisfactory data.

I like the sentiment of their penultimate paragraph wherein they visualize a sort of market for water operating within some framework of public control. My own thoughts are moving in the same direction, and from Dr. Smith's recommendation that we explore the use of flexible contracts and subcontracts I judge that his are also. On this basis I take hope in the thought that our economizing instincts are pushing us all toward compatible conclusions.

THE FARM OF THE FUTURE

CHAIRMAN: JOHN BLACKMORE, UNIVERSITY OF MASSACHUSETTS

THE ORGANIZATION AND STRUCTURE OF SOME REPRESENTATIVE FARMS IN 1975

H. L. STEWART
Agricultural Research Service, USDA

THE paramount agricultural problem of our time is that of depressed farm incomes in a period of rapid economic development and high levels of employment. Excess productive capacity, generated by output-increasing technology and inelastic markets, continues to create chronic, price-depressing surpluses which tend to transfer to others the benefits of agriculture's increasing efficiency. Yet the farmer has no choice. If he is going to stay in this competitive business of farming, he needs to adopt the techniques that will help him maintain his income by reducing unit costs or increasing his volume of business—even though ultimately these same innovations intensify the woes of agriculture by adding still more to troublesome surpluses.

The impact of these changes on the structure of agriculture has been great. Size of farm has increased rapidly, and capital requirements at an even greater rate. Farm people have been displaced. A bugaboo commonly referred to as "vertical integration" has cast a shadow across our time-honored institution of family farms.

No longer can even the agricultural fundamentalist believe that these are only temporary phenomena. The forces generating these changes will continue to modify the organization and structure of agriculture for many years and in many ways—some highly desirable, some less so. To attempt to foresee the nature and magnitude of these changes in different farm situations is a very large order, as well as a hazardous one. Thus, we shall interpret our subject rather narrowly. With the hope that we might contribute to a better understanding of some of the cause-effect relationships which are molding the structure of our agriculture, we shall focus our attention primarily on changes in number, size, organization, and capital and managerial requirements of a few selected types of commercial farms. We shall exclude consideration of farm ownership and entry, of the increasingly important part-time and part-retirement farms, and of the size and organization of our total agricultural plant. I believe, however, that the general tenor of the conclusions is consistent with the projections of Bachman and others, which suggest that by 1975, the number of commercial farms will be around 2 million and the average size of commercial

farms as measured by volume of sales, about $17,000, compared with $7,500 in 1954.[1]

Trends in Structure of American Agriculture

Historical changes in the structure of American agriculture are a matter of record. I shall note them briefly, however, because they cast their shadows before them, setting the pattern for changes both in the aggregate and in individual firms.

Largely in response to the economic impetus associated with World War II, to the continued rise in prices of labor relative to those of labor-saving techniques, and to the availability of nonfarm employment opportunities, farmers have adopted a whole array of technological and management improvements which have increased productivity and induced structural changes in farming. Farm output per man-hour has increased some threefold since 1939,[2] a period in which off-farm employment opportunities have been readily available. Total labor used in agriculture has been cut in half. Since 1930, more people have moved from farms than remain on farms.

Accompanying this reduction in labor requirements and farm population have been a marked reduction in number of farms, and an increase in average size of farm, in capitalization, in specialization, and in increased dependence on income from off-farm work and nonwork sources

TABLE 1. STRUCTURAL CHANGES IN AGRICULTURE, UNITED STATES, SELECTED YEARS, 1939–59

Item	Unit	1939	1944	1954	1959
Farm population	Millions	30.8	25.5	22.1	21.2
Number of farms	Millions	6.4	6.0	5.2	4.6
Number of commercial farms	Millions	4.2	3.9	3.1	—
Size of commercial farms	Acre	220	255	336	—
Hired workers per farm	Number	.42	.37	.40	.42
Investment per farm	Dollar Index	6,094[1]	10,328	22,592	33,455
Production inputs	(1947–49=100)	94	101	102[2]	101
Inputs, nonpurchased	(1947–49=100)	117	115	90[2]	82
Inputs, purchased	(1947–49=100)	79	90	111[2]	117
Man-hours of work	(1947–49=100)	123	120	78	66
Productivity	(1947–49=100)	84	96	107[2]	123
Farm output per man-hour	(1947–49=100)	64	81	140	191

[1] 1940.
[2] 1958.

[1] K. L. Bachman, "Prospective Changes in Structure of Farming," 36th Ann. Outlook Conf., Nov. 1959, Washington, D.C. Also C. P. Heisig, "Long-term Adjustments in Composition of Farm Production and in Production Inputs," *Policy for Commercial Agriculture–Its Relation to Economic Growth and Stability*, Joint Economic Comm. Rept., 85th Congress, 1st Sess., Nov. 1957, pp. 157-69.

[2] USDA, Agr. Res. Serv., Farm Econ. Res. Div., *Changes in Farm Production and Efficiency*, U.S. Dept. Agr. Stat. Bul. 233, Sept. 1959.

Table 2. CHANGES IN STRUCTURAL FEATURES OF SELECTED TYPES OF COMMERCIAL FAMILY-OPERATED FARMS, 1944 TO 1959[1]

Type of farm	1959 Compared with 1944					
	Cropland harvested	Cows	Labor	Hired labor	Net production[2]	Capital[2]
	Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Dairy farms:						
Central Northeast	122	134	79	56	164	133
Eastern Wisconsin	122	123	79	42	159	122
Other livestock:						
Hog, beef-fattening, Corn Belt	123	—	89	61	142	118
Cattle ranches, Intermountain	102[3]	123	98	112	138	114
Egg farms, New Jersey	100[3]	151[4]	120	67	269	140
Crop farms:						
Cash grain, Corn Belt	108	—	102	58	140	116
Wheat, grain sorghum, So. Plains	97	—	93	39	116	114
Wheat, small grain, No. Plains	109	—	73	42	88	127
Cotton, Southern Piedmont	87	—	80	84	130	117

[1] USDA, Agr. Res. Serv., Farm Econ. Res. Div., *Farm Costs and Returns, Commercial Farms by Type, Size and Location*, U.S. Dept. Agr. Info. Bul. 230, June 1960, and unpub. data from the Costs, Income, and Efficiency Res. Branch, Farm Econ. Res. Div., ARS.
[2] In constant dollars.
[3] Total land in farm.
[4] Laying hens.

(table 1). The input mix also has been modified greatly. Purchased inputs have increased by almost half during the last two decades in contrast with a 30-percent decrease in nonpurchased inputs. Almost overnight, agriculture has become one of the higher capital-using industries. We have reached a point at which about two-thirds of our agricultural production inputs are affected by the terms of trade[3] with other, more highly organized, sectors of the economy.

Changes in structure are greater on some sizes and classes of farms than on others. For example, although the total farm labor force has declined significantly, the exodus has come primarily from the smaller farms. There is some evidence to suggest, too, that short-time, seasonal workers constitute a higher proportion of the labor force in recent years than was the case previously.[4] Average numbers of hired workers per farm in the

[3] Inputs other than land and operator and family labor. For similar estimates in other countries, see N. Westermark, "Changes in Composition of Farm Inputs and Outputs," *Proceedings*, Internatl. Conf. of Agr. Econ., Mysore, India, 1958.
[4] Sheridan T. Maitland, and Dorothy Anne Fisher, *The Hired Farm Working Force of 1957*, U.S. Dept. Agr. Info. Bul. 208, June 1959.

United States have been relatively stable, in contrast to a decline in the number of hours of labor hired on commercial family-operated farms (table 2).

Encompassed in the net reduction of nearly 2 million farms during the last two decades have been substantial increases in numbers of part-time and residential farms, and in the larger commercial farms. These increases were more than offset by decreases in numbers of small commercial farms.[5] Of some 3.4 million small commercial farms in 1939 (those with less than $5,000 in sales at 1954 prices), some 400,000 had moved into higher income groups by 1954. But, at least in part because of capital and market restrictions that limited opportunities to take advantage of technological development, more than a million of these farms were either absorbed by larger units or they were reduced to part-time or residential units.

Factors Influencing Structure

The nature and degree of change in the structure of American agriculture have been influenced greatly, and in the years aheads they will be influenced even more, by the pull and haul of economic forces outside the agricultural sector. Opportunities to increase efficiency and reduce costs of production by adopting both known and as yet undeveloped technology will continue. But it is inevitable that agriculture will become increasingly dependent on other sectors, not only as a market for its products, but also as a source of its production inputs and an alternative employment for a part of its variable resources, especially labor.

As the general economy develops and the relative position of agriculture declines, impacts of the changing structure of demand for our agricultural products will become increasingly important in its influence on the organization and structure of different types of farms.

A number of analyses have been made of prospective changes in demand, and of production prospects compared with demand, by commodities and groups of commodities. These analyses vary in detail, partly at least because of the high degree of substitutability within various groups of commodities on both the demand and the production side. But the anticipated direction and relative strength of demand for various groups of commodities have been quite consistent, as has the usual implication that excess capacity will continue to characterize agriculture for some time to come.

Daly projected an increase in demand in 1975 about 25 percent above current production levels (1956-58) for crops and 46 percent for livestock and livestock products. The projected increase in demand for livestock

[5] J. V. McElveen, *Family Farms in a Changing Economy*, U.S. Dept. Agr. Info. Bul. 171, March 1957.

products varied from a little more than a third for dairy and poultry products to nearly half for meat animals.[6]

Rogers and Barton found a substantial variation in the probable ease with which we will be able to provide the quantities of various groups of products desired. After allowing for projected increases in crop yields and efficiency of feed use by livestock, and for the excess of current production above demand, they concluded that even if technical inventions should come to a halt, we could meet our prospective demands by 1975 with about one million fewer acres of oil crops and 4 million fewer acres of food grains than we harvested in 1956-58, but we would need to increase our cotton acreage by nearly 5 million acres and our feed grain acreage by some 15 million acres.[7] While these needs can be met readily with acreage currently in the Soil Bank, they do suggest that the type or types of production-control programs that may be in effect in the years ahead, as well as technological developments yet to come, will have significant but variable impacts on different types of farms.

In addition to the impact of market and other institutional restrictions, structural changes on farms of different types will be influenced greatly by the economies of size to be achieved through the spreading of fixed costs, by opportunities to increase volume of business and operators' labor income by substituting additional capital for labor or land, by the nature of current and alternative production techniques, by risk and uncertainty, and by the fixity of production resources and the availability of alternatives for their use. Changes to be made by farms representative of specific situations will be further conditioned by maladjustments in the current organizations of the farms, the availability of buildings, equipment, foundation herds and capital needed to facilitate adjustments, the length of the operators' planning periods as influenced by such factors as stage in the life cycle, and the various motivations and value judgments of the operators, including their aversion to risk and drudgery.

Prospective Changes in Commercial Farms

Dairy farms

No drastic change in the organization and management of typical dairy farms seems likely by 1975. The size of dairy herds will continue to increase, but family farms will continue to dominate the dairy industry.

Various analyses bearing on the economies of size of the dairy herd seem to substantiate this conclusion. Day and associates, for example, demonstrate a leveling-out of labor savings per cow when the herd

[6] Rex Daly, "Prospective Domestic Demands for Food and Fiber," *Policy for Commercial Agriculture . . ., op. cit.*, pp. 108-18.

[7] Robert O. Rogers and Glen T. Barton, *Our Farm Production Potential, 1975*, U.S. Dept. Agr. Info. Bul. 233, Sept. 1960.

reaches a size of 35 to 40 animals.[8] Burkett concludes "total capital per animal unit falls rather sharply until a size of about 30 animal units is reached. It then raises as herd size increases."[9] Fellows and his associates conclude that "operators of one-man farms (35 cows) can achieve a unit cost level approximately equal to the level on farms of larger size when a similar level of management efficiency is used."[10]

In an analysis of the effect of dairy systems on economies of herd size in the Corn Belt, Barker shows that the average short-run cost curve declines rapidly at first, then more gradually as herd size is increased. Average costs increase sharply when the herd approaches 34 or 35 cows with a stanchion parlor, about 41 to 43 cows with stanchion barns and three-stall parlors, and between 53 and 58 cows with six-stall parlors and 12-cow herringbone systems.[11]

Preliminary results in Minnesota indicate that a quarter-section dairy farm with 22 cows, a 26-cow stanchion barn, and a total investment of about $46,000, could maximize profits by increasing the milking herd to 43 cows if the stanchion-barn system were retained, and to 50 cows if an 8-cow herringbone system were adopted. The herringbone operation would have only a slight income advantage over the stanchion operation with current price-cost relationships. However, this labor efficient system would have an increasing advantage with increases in the relative price of labor.[12]

Another factor that might retard a drastic change in the organization and structure of dairy farms by 1975 is the fact that innovations in livestock production are adopted slowly. This is partly because of the biological nature of livestock production and the resultant high priority that must be placed on the reliability of equipment upon which livestock depend. It is partly because of the fixity of resources committed to livestock production and the integrated character of systems of equipment. Bulk tank and other specialized dairy equipment is not very flexible as to alternative uses or expansion possibilities. This is true also of stanchion barns, although there is a growing conviction that the addition of a holding shed represents a feasible means of providing flexibility in size of herds using stanchion barns. Farmstead equipment must be tailored not only to the buildings available but also to the field equipment—and vice versa. The

[8] L. M. Day, H. J. Aune, and G. A. Pond, *Effect of Herd Size on Dairy Chore Labor*, Minn. Agr. Expt. Sta. Bul. 449, June 1959.

[9] W. K. Burkett, *Farm Size and Capital Acquisition Problem on New Hampshire Dairy Farms*, N.H. Agr. Expt. Sta. Bul. 457, Feb. 1959.

[10] I. F. Fellows, G. E. Frick and S. B. Weeks, *Production Efficiency on New England Dairy Farms, Economies of Scale in Dairying*, Storrs Agr. Expt. Sta. Bul. 285-2, Feb. 1952.

[11] Randolph Barker and Earl O. Heady, "Economy of Innovations in Dairy Farming," Iowa Adj. Cent. in coop. with Agr. Res. Serv. (in press).

[12] Unpub. data developed by W. B. Sundquist and L. M. Day, Farm Econ. Res. Div., Agr. Res. Serv., in coop. with H. R. Jensen, Minn. Agr. Expt. Sta.

old field baler, for example, must go when materials handling is mechanized at the farmstead.

Capital rationing may be still another factor that will act to retard revolutionary changes in the structure of dairy farms. In contrast to an average capitalization of around $40,000 for commercial family-operated dairy farms with 22 to 28 cows per farm, current work at Minnesota indicates that it would require an investment of about $17,000 to expand a 22-cow stanchion barn dairy to a 43-cow operation, and $23,000 to expand it to a 50-cow herringbone operation.[13] With these high and increasing capital requirements, and with more than two-thirds of our milk cows in herds of less than 30 cows per farm,[14] it seems doubtful whether a significant proportion of our dairy farms will achieve by 1975 more than an efficient family-size operation of 35 to 40 cows, notwithstanding the many opportunities to increase operators' incomes by substituting additional capital for labor or land. Numbers of dairy farms will continue to decline and more and more of the small herds will drop out as a result of increasing capital and sanitation requirements, coupled with better employment opportunities in off-farm pursuits.

During a period of declining agriculture and relatively favorable investment opportunities in nonfarm sectors, an influx of capital in the amounts required for large-scale dairy operations seems improbable except in unusual circumstances. Exceptions will include unusual locational and associated specialization advantages, such as those of the drylot dairies in southern California. They might include dairy farms integrated with a feed business, with the entrepreneur interested primarily in maintaining the volume of his feed business. But such operations probably will continue to be atypical.

If the demand for dairy products by 1975 increases at the projected level indicated earlier, about 37 percent above current levels, and if production per cow increases by about a fourth, as has been projected,[15] the downward trend in cow numbers will be reversed, and total numbers of cows will increase by about 10 percent. Typical family-operated dairy farms probably will increase cow numbers by as much as the 25 or 30 percent that occurred during the last 15 years. Operators with stanchion barns likely will achieve herds centering around 30 or 35 cows per farm, and those with loose housing at a somewhat higher level.

Some operators will increase the acreages in their farms but the usual practice in the Northeast will be to intensify forage-production programs at the expense of grain production, and to buy more concentrates. In the

---

[13] Sundquist et al, *op. cit.*

[14] P. E. McNall, "Dairy Producers and Dairy Production," Bur. of the Census, Spec. Rept., Vol. III, Part 9, Ch. V, 1954 Census of Agr., U.S. Bur. of the Census and USDA Agr. Res. Serv.

[15] H. L. Stewart, "Prospects for Adjustments in Production and Resource Use," 36th Ann. Outlook Conf., Washington, D.C., Nov. 1958.

Midwest, there will be a tendency to intensify both forage and grain production and perhaps to increase the acreage of each.

Other livestock farms

Other livestock farms have much in common with dairy farms. They, too, offer opportunities to increase incomes through specialization, reductions in investment-output ratios, and substitution of additional capital for labor or land. This is especially true on farms where the quantity or quality of labor is limiting and where increases in the relative price of labor have made labor-saving techniques an increasingly good buy. However, reduction in unit costs usually tend to level out within the potential size range of family farms. For despite the apparent trend toward specialization, the bulk of our livestock production will continue to come from farms on which the farm family provides most of the labor and management.

Scoville found unit costs on a large-scale livestock farm to be only 5 percent lower than on a comparable one-man farm.[16] Similarly, Mosher found that "the optimum use of land, labor and capital was found on farms of 260 to 339 acres in northern Illinois."[17]

The extent to which managerial limitations affect economies of scale is not very clear. Most of our analyses assume that managerial skill increases in proportion to size of farm. Yet our experience suggests that management is especially limiting in livestock production. Certainly few skilled livestock men are available for hire. Wilkins reports that the main point brought out by a recent Indiana study was "that a farmer's ability to manage the hog business has more influence on costs than the number of sows and litters raised each year, so long as facilities are used to best advantage."[18]

Livestock farms of the Corn Belt will continue to expand in size, to decrease in numbers, and to provide their share of any increase in the supply of red meat that the market may take. Some increase in specialization of production seems probable also. Forage limitations will encourage some operators to expand the hog rather than the beef enterprise. Those with adequate capital and managerial ability may expand hog production substantially in order (1) to take advantage of labor and other economies associated with central farrowing and confinement finishing, and (2) to provide the quantity, quality, and uniformity of product required by the market. Labor, as well as capital and managerial limitations, will prevent

[16] O. J. Scoville, *Relationship Between Size of Farm and Utilization of Machinery, Equipment and Labor on Nebraska Corn-Livestock Farms,* U.S. Dept. Agr. Tech. Bul. 1037, Sept. 1951.

[17] M. L. Mosher, *Farms Are Growing Larger,* Ill. Agr. Expt. Sta. Bul. 613, July 1957.

[18] G. L. Wilkins, "Hog Farmers Intensify for the Sixties," *Nations Agriculture,* Vol. 35, No. 4, April 1960.

most operators from expanding to the 1,000 to 1,200 hogs that one man can raise. But in contrast to the average of 170 hogs currently raised on family-operated hog-beef fattening farms, production of some 500 to 600 hogs per farm may not be uncommon in the Corn Belt. According to Van Arsdall's preliminary investigations at Illinois, facilities for such an enterprise would require an investment of some $10,000 to $12,000. His findings indicate that the investment in central farrowing facilities and confinement finishing quarters may approximate $20 per pig capacity.[19] These hog farmers will increase feed grain production by shortening their rotations and using more fertilizer, but they will need to buy more concentrates.

Other livestock producers, especially those in the fringe area around the Corn Belt, who are not in position to expand their hog enterprises substantially may increase the size of their beef enterprises in an effort to decrease unit costs, increase volume, and achieve a product more amenable to specification buying. Still other Corn Belt producers will eliminate all livestock enterprises, take off-farm jobs, and shift to cash-crop production as part-time operations.

With 9 in 10 livestock producers still using manual techniques in their livestock operations, except for tractor-powered transportation, high labor costs and a scarcity of dependable and qualified labor will induce the larger operators to acquire considerably more materials-handling and other improved equipment. There is evidence, for example, that a mechanized distribution system has become the most economical method of delivering feed to feed bunks with a herd of only 50 steers.[20] Some of the smaller operators also will acquire such equipment as a matter of convenience and aversion to drudgery.

Cattle ranches

Cattle ranch organization probably will change less in the next 15 years than will the livestock farms of the Corn Belt. Already highly specialized, and with very limited production alternatives, their opportunities for change are limited. They too, however, will be influenced by the trend toward large-scale retailing of meat, and its effects on packing plants, packer buyers, contract feeders, and order buyers. Cow-calf and stocker cattlemen—the primary producers of much of our feeder cattle—will be under compulsion to modify both size of business and quality and timing of product to meet large-scale marketing demands reflected by the order buyer and the contract feeder.

Specialization and lower investment-output ratios of large-scale feeding operations will encourage some expansion in such operations. This

[19] Unpub. data developed by Roy N. Van Arsdall, Farm Econ. Res. Div., Agr. Res. Serv., in coop. with Ill. Agr. Expt. Sta.

[20] Van Arsdall, *ibid.*

will be especially true in the western and southwestern areas where the impact of an expanding market coincides with the availability of livestock, excess supplies of feed grains, and the forages required to supplement them. Managerial limitations and associated risks and uncertainties will be major limiting factors in such developments. In contrast, the availability of farm-grown feeds and of otherwise unmarketable operator and family labor and management will continue to maintain the competitive position of efficient farm feeders in the Midwest. They will continue to represent much of the rancher's market for feeder cattle. A premium on young cattle resulting from continued large supplies of relatively cheap feed grains could encourage the marketing of light feeder cattle to either farm or large-scale feeders.

Poultry farms

The widely publicized changes made in recent years in the broiler industry may well portend what is to come in the egg business. Size of laying flocks will increase, though generally not beyond the limits of the farm family to provide most of the labor. But the family poultry farm may well be in jeopardy through loss of much of the managerial function bargained away by contract.

Poultry production has become a high-risk industry. Rapid developments in technology, shifts in interregional competition, and depressed prices are forcing out the small, inefficient operators. Marketing arrangements are especially pertinent. Quantity buying to specification is eliminating the market for small producers. Corporate food chains accounted for 43 percent of all grocery sales in the United States in 1958.[21]

The broiler industry continues to adjust to new production and marketing techniques. Broiler producers and contractors alike are learning that the comfortable margins enjoyed earlier are a thing of the past. No longer are small, part-time producers encouraged in the broiler business. Even the typical current flock of some 10,000 to 20,000 birds is no longer adequate to yield a return to both labor and capital. Units of some 35,000 to 50,000 birds per flock, with four flocks produced per year, are required to provide sufficient capital accumulation potential to amortize in less than 25 years minimum investment costs of $1.00 per square foot of housing space.[22]

The egg industry is showing a marked tendency to follow the pattern set by broilers. Margins are down. The squeeze to increase efficiency of production, which has eliminated many small producers, will continue. Production in 1975 may be largely under contract, with the producer

[21] "Economic Inquiry Into Food Marketing, Part 1, Concentration and Integration in Retailing," Staff Report to the Federal Trade Comm., Jan. 1960.

[22] Unpub. data developed by George Frick, Farm Econ. Res. Div., Agr. Res. Serv., in coop. with the N.H. Agr. Expt. Sta.

providing labor, housing and equipment and the contractor making many of the managerial decisions. Farm flocks as we have known them will be practically eliminated, chiefly because farmers cannot provide either the quantity or quality of product required by specification buyers. Specialized poultry farms will prevail, with modal size laying flocks of around 6,000 to 10,000 birds, and with many producers having up to 35,000 to 50,000 birds.

Crop farms

The structural characteristics of specialized cash crop farms are especially likely to be determined by restrictions imposed by demand and associated production-control programs, and by limitations imposed by risk and uncertainty. This is true especially of wheat farms, where both demand and production alternatives are limited and yield uncertainties are extreme.

Mechanization has greatly increased the size of crop farm that the farm family can handle. Self-propelled combines and diesel tractors continue the pressure to expand size of farm. But beyond the limits of the acreage which, with a balanced "line" of equipment, will minimize unit costs, opportunities to achieve increasing returns to size are more limited than is sometimes supposed. Rude shows increasing volume of business but only minor reductions in investment-output ratios in moving from 800- to 1,700-acre Montana wheat farms when balanced "lines" of equipment are used.[23] Janssen found that a two-man Corn Belt cash-grain farm could handle about twice as many resources as a one-man farm, but that certain inefficiencies and capacity limits of discrete machines limit the amount of land that three- and four-man farms could handle.[24]

Heady and colleagues conclude that a Corn Belt cash-grain "farm of 240 acres, one falling within most definitions of family farms, is large enough to realize the major reductions in costs."[25]

Heady found moderately decreasing unit costs over a wide acreage, but he concluded that although most operators believe greater profits could be achieved with larger units, "the uncertainties of price and production dampen tendencies to strike out (borrow funds to operate a larger unit) and endanger the equities they have built up."[26]

This area of risk and uncertainty, like the area of managerial limitations, represents one of the least understood, yet one of the most impor-

---

[23] Leroy C. Rude, *Land Use Alternatives for Dryland Cash-grain Operations, North Central Montana,* Mont. Agr. Expt. Sta. Ag. Ec. Res. Rpt. No. 9, Nov. 1959.

[24] M. R. Janssen, "Integration of Capital and Labor on Corn Belt Cash-grain Farms," Doctoral diss. subm. to Harvard Univ., April 1953.

[25] E. O. Heady, Dean McKee, and C. B. Haver, *Farm Size Adjustments in Iowa and Cost Economies in Production for Farms of Different Sizes,* Iowa Agr. Expt. Sta. Res. Bul. 428, May 1955.

[26] *Op. cit.*

tant factors influencing the structure of farms. This is especially true in the higher risk, cash-grain areas where a better understanding of economies of risk and uncertainty may one day modify our conclusions about economies of size.

The size and structure of specialized wheat farms seem destined to change even less in the next 15 years than those of almost any other major type of farm. Conceivably, production-control programs could encourage diversification of production on wheat farms. But it seems more likely that market and program restrictions, together with risk and uncertainty, will continue to restrict changes as they have in the past. In addition to the usual price and production uncertainties, market uncertainties will serve as an additional deterrent to an inflow of capital from outside sources.

It seems probable that the average size of specialized wheat farms may increase another 15 or 20 percent by 1975 as some of the smaller farms are absorbed by other operators in an attempt to enhance returns through decreased unit costs or larger volumes of business. The average acreage of wheat per farm probably will not increase greatly from current levels if restrictive types of production-control programs continue, but the acreage of feed grains may be increased. Should production of wheat for feed be permitted on unallotted acres, the acreage of wheat would be increased at the expense of grain sorghums and barley. Should all production controls be eliminated, the average acreage of wheat per farm would increase more rapidly. Numbers of farms would decrease proportionately as the smaller, less efficient units were absorbed.

Few wheat farmers will go into livestock production in a big way. In areas where forage production is dependable, livestock production can be a profitable supplementary enterprise when wheat production is restricted.[27] But wheat farmers are noted for their aversion to intensive livestock enterprises, and extensive livestock enterprises have been shown repeatedly to be an unprofitable alternative to wheat in the specialized areas.[28] Large-scale drylot feeder enterprises are attracting considerable attention in some of the wheat areas where feed grain production has expanded greatly. Their future will be governed by some of the uncertainties mentioned earlier. But it is doubtful whether major livestock enterprises will become an integral part of our wheat farms.

Conclusions

While the structure of American agriculture will continue to change, the impacts will be much greater on the small, marginal units than on typical medium-to-large family-size operations.

---

[27] E. O. Ullrich, L. W. Schaffner, C. G. Edgerly and D. F. Evelath, *Opportunities for Improving Income from Cream Production in North Dakota,* N.D. Agr. Expt. Sta. (in press).

[28] See for example H. G. Sitler, "Economic Possibilities of Seeding Wheatland to Grass in Eastern Colorado," USDA, Agr. Res. Serv., ARS 43-64, Feb. 1958.

Typically, the family farm will achieve greater specialization of function without losing management control. It will increase size but decrease number of enterprises. It will hire more functions formerly performed by the operator, such as spraying, dusting, fertilizing, and even aid in management, including perhaps the purchasing and marketing of livestock. The family farm will continue to increase in size and to adopt other labor-using and output-increasing innovations essential to survival in the competitive business of farming.

Important differences exist between types of farms and individual farm operators in the changes in size, organization, and management that are both feasible and essential for survival. But with a few notable exceptions, the family farm, with the operator and his family providing most of the labor and management will continue to be the predominant production unit in most types of farms.

Vertically integrated operations will dominate the poultry industry, largely because of marketing requirements associated with large-scale retailing. Large-scale or factory-type operations will become increasingly important in livestock-feeding operations in the West and Southwest where there is an exceptional confluence of an expanding market and livestock, feed grain, and forage supplies. But even in these regions it will be held in check by managerial limitations and associated risks and uncertainties. In the Midwest, the availability of farm-grown feeds, and of otherwise unmarketable operator and family labor and management, will more than offset advantages of large-scale specialization that are unachievable in efficient family-size operations.

As output per farm increases, resultant pressures on the market will require further reductions in numbers of farms and even greater increases in efficiency. Farm operators will become increasingly dependent on nonfarm sectors of the economy for both their markets and their production inputs. More and more farm people will need to turn to nonfarm pursuits for employment—many for their full-time vocation, others for a part-time supplement to their income from farming. The latter will tend to deter the trend toward larger farms—the former to facilitate it. The proportionate numbers of farmers requiring off-farm employment will vary between types of farms in accordance with required changes in the organization and structure of their farms.

Factors limiting desirable changes in the organization and structure of farms by 1975 will include risk and uncertainty, managerial requirements and capital requirements, all of which will increase greatly. Capital requirements are the subject of the following paper. And to comprehend the impacts of risk and uncertainty and of managerial limitations in almost any farm situation will require a great deal more study.

FINANCING REPRESENTATIVE FARMS IN 1975

AARON G. NELSON*
University of Arizona

THE preceding paper by H. L. Stewart portrays the probable organization and structure of some major types of "representative" farms in 1975. All are expected to use more capital. Acquiring adequate capital for efficient farming always has been a problem in this country, and the representative farmer in 1975 undoubtedly will be challenged with the same problem.

The objective of this paper is to consider how the representative farms might be financed in 1975. As is the case today, the primary sources of capital probably will be: (1) equity capital, (2) credit (used synonymously with borrowed funds or capital in this paper), and (3) rented capital assets. The combination of equity capital and credit probably will continue to occupy a paramount position in farm finance. Thus, the approach in this paper is to first consider use of credit in terms of how much lenders are likely to loan and of the amount owner-operated representative farms could safely use. The indicated amount of equity needed is then considered from the viewpoint of whether representative farmers likely will have that much owned capital. Consideration is then given to renting as a source of capital assets to supplement and/or replace equity and borrowed capital.

Credit Extension and Use in 1975

Developments in lending institutions probably will facilitate a relatively greater use of credit by representative farms of 1975 than by comparable farms today. Employment of agriculturally trained men by commerical banks, for example, will facilitate more adequate analysis of needs and opportunities for using credit. These men will be able to better visualize possibilities associated with technological progress, which will contribute to earlier and more adequate financing of such developments. Progressive lenders may even use a portion of their loan funds to encourage adoption of technology. Timing payments to coincide with expected income, and greater use of intermediate-term credit and of nonamortized and open-end mortagages also will provide additional opportunities for credit extension and use.

Business arrangements among lenders, such as between commercial banks and insurance companies, will facilitate "package financing" wherein the lender and farmer jointly work out a complete coordinated

* I am indebted to my colleagues, Clarence D. Edmond and Maurice M. Kelso, for helpful suggestions and criticism in preparation of this paper. Any errors of fact, logic or judgement are, of course, my responsibility.

program. Such comprehensive credit service contributes to profitable extension of more credit on a sounder basis. Closer linking of major financial institutions with agriculture will augment the supply of credit available, particularly during peak seasons—providing agriculture can successfully compete with other segments of the economy.

Other developments which may facilitate use of credit include insurance and futures contracts. Some types of insurance, such as fire and extended coverage, have been used in credit extension for a long time. However, tieing life insurance to use of credit is of more recent origin and probably will expand further. The same is true of crop insurance. Loan insurance has been used successfully in urban home financing and by the Farmers Home Administration. At least one commercial company is now active in the urban home-loan insurance field. Thus, it appears that if the need develops, loan insurance might expand to commercial farms. A wider use of futures contracts as a hedge against price declines may also contribute to added use of credit.

Factors such as these indicate lenders probably will be able to extend relatively more credit in 1975 than today. However, the amount of credit which may be safely extended and employed will still depend upon circumstances of the particular farm involved. Thus, we turn to use of credit by individual farms, considering first the principles involved and then the application of principles to the representative farms.

Guiding Principles in Use of Credit

Considerations involved in determining how much credit can be safely used, logically, fall into three groups pertaining to returns, repayment capacity, and risk-bearing ability—introduced here as the *Three R's of Credit*.[1] Returns, the first R, refers to the most profitable amount of credit which can be used in the business, while the other two R's, Repayment Capacity and Risk-bearing Ability, indicate limitations or adjustments which may be necessary in some cases for the loan to be sound.

Considerations involved in analyzing *returns* associated with use of credit are readily understood by agricultural economists since the problem is one of maximizing returns. However, repayment capacity and risk-bearing ability involve some concepts which might well be briefly reviewed.

A borrower's *repayment capacity* depends in large measure upon the type of assets acquired with loan funds, assuming the business is profitable. Funds used for variable expenses, in effect, become a part of gross

[1] For a more complete discussion of the concepts involved see: Nelson, Aaron G., *Credit As A Tool for the Agricultural Producer*, No. Central Reg. Ext. Publ. No. 4 (Great Plains Agr. Council Publ. No. 15), 1957, pp. 6-12; and Murray, William G. and Nelson, Aaron G., *Agricultural Finance*, Fourth Ed., Iowa State Univ. Press, 1960.

income in the production process and, therefore, loans for these purposes may be repaid from gross income. Similarly, if items which depreciate are acquired the "depreciation" enters the gross cash income flow as the items are "used up" in the production process. Thus, loans for such items also may be repaid from gross income—providing the amount of depreciation is equal to the loan payments. If loan payments exceed the depreciation, the excess must be paid from net income. On the other hand, when loan funds are used to acquire assets that do not depreciate, such as land which does not erode or otherwise deteriorate in production, the entire amount of the principal payments must come from net income. It is evident, therefore, that when loan funds are used to acquire assets which are "used up" in the production process repayment capacity will be much greater (assuming the business is profitable) than when nondepreciable assets are acquired. Repayment capacity for acquiring assets which do not depreciate, and for covering payments in excess of depreciation, is limited to ability of the farm family to save.

Risk-bearing ability refers to ability to withstand unpredictable losses and expenses and continue in farming. The considerations involved go further than with either returns or repayment capacity. Analyses of how much it will pay to borrow and of repayment capacity are based upon *average* conditions expected to prevail during the life of the loan. However, consideration of and need for risk-bearing ability arises from the possibility of reduced income caused by risk and uncertainty involved in farming and family living, such as drouth, unusual livestock losses, falling prices and sickness. In other words, the amount of risk-bearing ability needed depends upon the extent to which expenses may be higher and income may be lower than average, and the probable frequency of such deviations.

Risk-bearing ability provides the "last line of defense" in use of credit. If a promising venture proves unprofitable, risk-bearing ability must shoulder the load. If a farmer who borrows funds for operating expenses experiences a poor year, his repayment capacity from current income probably will be inadequate to repay the loan and the load will be shifted to risk-bearing ability. This does not mean the first two R's do not have important roles to play. The first, returns, indicates the optimum amount it will pay to borrow—something which risk-bearing ability cannot do. Similarly the second R, repayment capacity, indicates how much credit can be repaid under average conditions—again something risk-bearing ability cannot do. Each R has its own role to play in analysis of use and extension of credit.

Use of Credit by Representative Farms

The credit analysis presented here is based upon the representative farms of 1975 as outlined in the preceding paper. With their organization

and structure being given, it is assumed the farms will be profitable businesses. Therefore, we forego an analysis of returns and proceed directly with the analysis of repayment capacity and risk-bearing ability. The analysis is presented in some detail for the representative dairy farm to give a picture of what is involved. Then the analysis for other selected representative farms is summarized in terms of the same framework. In each case the analysis was made in terms of an estimated 1975 price level based upon material in the preceding paper and the long-run price and cost projections made by the U.S. Department of Agriculture.[2] However, it should be recognized that the relationships involved are of prime importance in credit analysis and that using a different price level would not materially alter conclusions relative to acquisition and use of credit.

Dairy farms

Estimated financial data for a representative dairy farm in 1975 are given in Table 1. The farm was assumed to be located in eastern Wiscon-

TABLE 1. ESTIMATED FINANCIAL DATA FOR A REPRESENTATIVE 40-COW DAIRY FARM IN EASTERN WISCONSIN IN 1975

Assets		*Income and Expenses*	
Real estate	$30,000	Gross cash income	$17,500
Non-real-estate	28,000	Cash expenses, farm	13,300
Total	$58,000	Net cash income	$4,200
Liabilities		Cash living expenses, including income and social sec. taxes	3,400
Real estate loan	$19,500		
Non-real-estate loan	15,500	Balance	$ 800
Total	$35,000		
Net Worth	$23,000		

sin and to have about 40 cows. Machinery and equipment and milk cows were inventoried at one-half their "new" cost. The loans were assumed to be "full"; i.e., to represent the maximum amount commercial lenders might consider loaning to the representative farmer. Interest at the rate of 5 per cent on real-estate and 6 per cent on non-real-estate loans was included in cash expenses. Income and expense items are portrayed in cash terms since repayment capacity depends upon cash income. However, it was assumed the cash figures would not be materially affected by annual inventory fluctuations.

Repayment capacity. As indicated in the above discussion, a farmer's repayment capacity is measured by the amount of credit he can normally repay in a given period of time. However, the primary test or limitation on his repayment capacity arises from his ability to meet principal payments on loans for acquiring assets which do not depreciate and to cover

[2] *Agricultural Price and Cost Projections,* U.S. Dept. Agr., Sept. 1957.

the amount by which principal payments exceed depreciation. Thus, the first step in analyzing repayment capacity is to consider loans outstanding from these points of view.

Payments on the real estate loan, shown in Table 1, were set up on a 35-year basis, with annual principal payments of $557 to be made until the loan was reduced to 50 per cent of the value of the security. Part of the annual principal payment—the amount paid on the loan on the land—would constitute a payment from net income to equity capital. This amount was estimated to be $300. The balance of the payment would be made from gross income, since depreciation on the buildings enters the gross income flow.

The non-real-estate loan was assumed to be on livestock, machinery and equipment, and feed on hand when the inventory was taken. The repayment schedule on the livestock and the machinery and equipment loans was set to approximately equal the rate of depreciation, and therefore, these loans would be repaid from gross income.[3] Since the feed loan constituted an operating expense loan it, too, would be repaid from gross income.

The analysis to this point indicates that most of the borrowed funds used by the dairy farmer would be repaid from gross income and, therefore, should not present a problem from the repayment capacity point of view, providing the business was profitable. Only the $300 principal payment on the land loan would come from net income. However, inherent in the analysis is the assumption that size of farm is constant, and since representative farms of 1975 probably will be increasing in size, the investigation needs to be carried a step further to consider how this would affect repayment capacity.

Comparing the representative dairy farm used in this analysis with its counterpart today, as portrayed in the preceding paper, indicates the *annual* increase in capital per farm will average about $1,100 from 1960 to 1975. If this rate of "build-up" prevails in 1975 and if credit comprises about the same proportion as in Table 1, the typical dairy farmer will have to add an average of $400 to $500 of equity capital annually to his business to maintain an average rate of growth and technological advancement. Equity capital additions are derived from net income, unless a farmer has available capital outside the business. If we add $450 required for the "build-up" of equity capital to the $300 principal payment on the land loan, referred to above, a total of $750 is obtained and rep-

[3] The assumption that principal payments on these loans would approximately equal depreciation should maintain adequate security for the lender. The loans assumed were less than the value of the assets, and if payments equaled depreciation the margin would be maintained. In fact, it would become larger relative to the unpaid balance as principal payments were made on the loan.

resents the amount of annual repayment or savings capacity needed by the dairy farmer. As indicated in Table 1, the net cash balance after living expenses were deducted was estimated to be $800, so repayment or savings capacity should be adequate.

Risk-bearing ability. Risk-bearing ability, as indicated above, is needed to withstand unpredictable losses and expenses. Analysis of repayment capacity is based upon conditions as they are expected to prevail during the planning period. It is recognized that some variations will occur in production, price, etc., during the period, but since their magnitude is not known average conditions are assumed. Thus, risk-bearing ability is needed to facilitate continuity of operation during unfavorable periods.

A study of agriculture in the area where the representative farm is located indicates that in one out of approximately five years net cash income of the representative dairy farmer might be expected to drop about 25 per cent below the average. With this fluctuation and other hazards confronting dairy farmers, it was estimated the representative dairy farmer would need risk-bearing ability equal to about $3,000. With this amount of risk-bearing ability he could meet unexpected drops in income and other unexpected operating, capital and living expenses without materially disrupting normal farm operations.

Would the representative dairy farmer have the needed risk-bearing ability? As indicated in the discussion of repayment capacity, the estimated net cash balance after living expenses was $800, which left $50 after deducting the $750 needed for principal payments on the land loan and for the "build-up" of equity capital in the business. Thus, there is practically no cash balance with normal operations to provide risk-bearing ability. However, in difficult periods living expenses probably could be cut to, say, $2,500, and the principal payment on the land loan probably could be deferred. Also, the "build-up" of capital normally would take place in years of average or above average income. Moreover, some expenses, such as repairs on permanent improvements, probably could be deferred. Thus, it appears that about $2,000 might be derived from these sources.

Could help be derived from credit? As indicated above, the loans were assumed to be "full" and thus some lenders would not be inclined to extend more credit. Some lenders, however, interpret a "full" loan as the maximum they would loan to a new borrower; but they would "let the bucket run over" in order to stay with a good established borrower confronted with adversity beyond his control. This is true particularly where only one lender is involved—such as where a commerical bank handles both the real-estate and non-real-estate financing. Thus, whether or not the representative dairy farmer would have adequate risk-bearing ability would depend in large measure upon his credit rating and his lender.

With a good credit rating and a single progressive lender, he probably could get by. Moreover, if loan insurance were available, it might materially strengthen his risk bearing ability.

Other representative farms

Applying similar analyses and assumptions to representative Corn Belt hog-beef fattening farms, intermountain livestock ranches, integrated poultry farms, and Northern Plains wheat–small-grain farms indicates that all would have adequate repayment capacity. Living expenses could increase to around $5,000 on the hog-beef fattening farm and the cattle ranch and still leave surplus repayment capacity. The stronger repayment capacity of these farms would result from the units being 50 to 75 per cent larger, in terms of capital managed, than the other farms.

Risk-bearing ability of the farms would depend upon the circumstances involved in each case, including location of the unit from the standpoint of natural hazards. Hog-beef fattening farms in the more stable parts of the Corn Belt probably would have sufficient risk-bearing ability to use about the same relative amount of credit as the dairy farmer, while in areas where more uncertainty is involved, credit employed probably would have to be reduced. Risk-bearing ability of the representative intermountain cattle ranch probably would also support use of about the same relative amount of credit as the dairy farm. Ranches in the intermountain area sometimes experience relatively low income for 3 or 4 years in a row. However, the relatively high average level of income on the representative cattle ranch would enable it to carry through low income periods without too much difficulty. The amount of credit which risk-bearing ability of the integrated poultry farm would support would depend to a considerable degree upon the nature of the contract. With a short-term contract the amount likely would be small. Risk-bearing ability of the Northern Plains wheat–small-grain farm probably would support a relatively smaller credit load than was the case with the dairy farm due to the greater risk involved. It was assumed the wheat farmer would use crop insurance to reduce risk, but judging from past experience and Thair's study in North Dakota, income would still vary greatly.[4] Average income on the wheat farm would not be much greater than for the dairy farm and, therefore, would not add risk-bearing ability needed to cover the added risk, as was the case with the cattle ranch. Therefore, the amount of credit employed by the wheat farmer would have to be reduced, probably by about 10 per cent, to bring it in line with risk-bearing ability.

[4] Thair, Philip J., *Stabilizing Farm Income Against Crop Yield Fluctuations*, N.D. Agr. Expt. Sta. Bul. 362, 1950.

Equity Capital in 1975

With owner-operated units and use of credit as outlined in the preceding analysis, the amount of equity capital needed for the representative farms would vary from about $23,000 for the dairy farm to about $50,000 for the hog-beef fattening farm and the cattle ranch. What are the chances of representative farmers having these amounts of equity capital in 1975?

A categorical yes or no answer to this question does not seem feasible. It will depend upon the circumstances involved in each individual case and the factors influencing accumulation of equity capital between now and 1975. With many current and recently retired farmers being fairly well situated financially, many representative farmers of 1975 will receive substantial equity capital from gifts and inheritance. Savings from current income will also contribute equity capital. However, representative farmers of 1975 probably will have acquired less equity capital from savings than their counterparts today, since generally, they will not have had the benefit of the high farm income associated with World War II. Historically, net savings have contributed only a relatively small amount of equity capital for farmers as a group.[5] The rate of savings may increase somewhat during the next 15 years due to higher income associated with larger farms and continued "forced savings" arising from farm capital needs. However, it will tend to be retarded by increased family living expenses and possibly by a feeling that with social security less "voluntary" savings will be needed.

Incorporation probably will be used by a substantial number of farmers in the future to facilitate obtaining equity capital.[6] The corporation provides a means whereby members of a family and/or other individuals may pool their savings to provide equity capital for a business. Being a legal entity, the corporation may borrow, make contracts, and the like to supplement equity capital the same as an individual proprietor.

In addition to facilitating accumulation of savings, the corporation provides a means for maintaining or holding blocks of equity capital to-

---

[5] Tostlebe, Alvin S., *Capital in Agriculture: Its Formation and Financing since 1870*, Princeton Univ. Press, 1957, pp. 145-6. Net savings represent "Amounts derived from net income that were used to increase physical capital, to augment cash balances and financial reserves, or to reduce debt." (P. 144.)

[6] Until recently incorporating family farms was considered impractical due, in part, to relatively high Federal corporate tax rates and double taxation of dividends. Revision of Federal tax laws in 1958 largely removed this impediment by permitting profit or loss of certain small business corporations to be passed on to shareholders, as with a partnership, to be taxed as a part of personal income. Thus, the door was opened to greater use of the corporate vehicle by commercial family farms. While a few states prohibit such corporations, restrictive legislation probably will be changed when a sufficient number of farmers find it to their advantage to incorporate.

gether by facilitating transfer of operating farms from one generation to another. This feature assumes added importance as the size of farm business increases. The ability to transfer ownership of undivided interests provides an easy means for members of a family to buy into the farm business and to dispose of inherited interests, and for the one taking over the farm to gradually acquire ownership.

It is evident that representative farmers will derive equity capital from different sources and by various combinations of sources. Some will be able to accumulate adequate equity capital with little difficulty, while others may fall short of the amount needed. Those unable to accumulate an adequate amount of equity capital would also be restricted in the amount of credit they could safely use. Thus, we turn to renting as a means of acquiring capital to fill voids left by owner equity and credit, and to take the place of credit in cases where the farmer may prefer renting to borrowing.

Renting Capital in 1975

Rented assets are an important source of capital in agriculture and probably will be used to a greater extent in the future, particularly with chattel assets. It takes various forms, including share and cash leases, custom use of capital goods, and some contracts used in vertical integration.

Using rented assets to replace or supplement equity capital and credit would have a number of impacts on financing the business. It is recognized that a number of customs and practices, as well as the attitude of farmers and the public, probably would need to be modified for renting to increase significantly as a source of capital. However, these aspects of renting are beyond the scope of this paper. Consideration here is limited to a brief analysis of use of rented capital assets by representative farmers of 1975 as (1) a supplement to equity capital and credit, and (2) as substitute for credit. The analysis is made in terms of the effect using rented capital would have on the farmer's repayment capacity and risk-bearing ability, assuming that marginal net returns to equity, borrowed and rented capital would be equal.

Using rented assets to *supplement equity capital and credit* would mean the farmer lacked equity capital to operate a farm as large as the representative farms of 1975 described in the preceding paper. Thus, the farmer would use the equity capital and credit at his disposal along with rented assets to provide the capital required for a representative farm. How would repayment capacity of a farm financed in this way compare with that of the same size of farm using only equity capital and credit?

The answer to this question depends upon the effect that using rented

assets in place of equity and borrowed capital, would have on net income and on principal payments made from net income. Replacing equity capital with rented assets obviously would reduce the amount of net income derived from equity capital. Similarly, replacing borrowed capital with rented assets would reduce the principal payments made from net income. If the reduction in principal payments were greater than the reduction in the net income from equity capital, repayment capacity would be strengthened by renting. Such a relationship might often be the case with land, or nondepreciable assets. However, it is less likely that renting depreciable assets would strengthen repayment capacity since principal payments on this type of loan would come largely, if not entirely, from gross income.

Using rented capital as a *substitute for credit* would indicate that a farmer had enough equity capital and credit to operate a representative farm in 1975, but that he would prefer to use rented assets in place of part of the credit. How would substituting rented assets for credit affect repayment capacity? Generally, such a substitution of capital would strengthen repayment capacity. Renting land would obviate the need for meeting principal payments from net income, and renting depreciable assets would remove the possibility of having to use net income to cover principal payments in excess of depreciation.

The effect of renting on risk-bearing ability depends on the type of lease, kind of assets, and terms of financing. With chattel assets the term of lease or custom use is usually relatively short. This adds flexibility to the business and in turn increases risk-bearing ability. With real estate the situation is somewhat different. Reasonable security of tenure is needed, and for a cash or share renter to have security somewhat comparable to an incumbered owner, the lease must be for a fairly long term. Thus, with a cash lease the annual cash payments would be fixed the same as payments on the loan. A cash lease, therefore, would not increase risk-bearing ability unless it increased net income. In fact, it might reduce risk-bearing ability if principal payments on the loan could be deferred and repairs on improvements put off during poor periods. A share lease, on the other hand, probably would strengthen risk-bearing ability since rental payments would vary with production and prices.

Summary

The objective of this paper was to consider how representative farms, discussed in the preceding paper, might be financed in 1975. They probably will use various combinations of equity capital, credit, and rented assets similar to today. While the situation will vary considerably from farm to farm, equity capital probably will make up a relatively smaller part of total capital. Representative farmers of 1975 probably will derive

more equity capital from gifts and inheritance, but not having the benefit of high farm income and inflation associated with World War II, the amount of equity capital derived from these sources will be smaller. However, a number of representative farmers probably will incorporate their farm businesses which will likely increase the relative amount of equity capital in these cases. Credit probably will be used to a relatively greater extent than today due to the farms being larger and having the repayment capacity and risk-bearing ability to safely use more credit. Developments in lending institutions also will contribute to use of relatively more credit, providing agriculture can compete successfully with other segments of the economy. Rented capital probably will also be relatively more important in 1975 than today, providing rental arrangements and public attitudes are favorable.

DISCUSSION: THE FARM OF THE FUTURE

D. C. MYRICK
Agricultural Research Service, USDA, Bozeman, Montana

It is a pleasure to discuss these excellent papers by Mr. Stewart and Prof. Nelson. Each deals systematically with its assigned topic, and covers in its allotted space a wide field. My compliments to workmanship.

A well-worn expression from our day says "these are exciting times in which to be alive." But are they exciting for our representative farmers?

In his introduction, Mr. Stewart paints a gloomy picture: (1) depressed farm incomes (when we read almost daily that we never had it so good), (2) bigger farms and increasing capital requirements, (3) displacement of farm people, and (4) vertical integration in some way in conflict with the family farm. He states his problem as "the changes in number, size, organization, and capital and managerial requirements of a few selected types of commercial farms."

The next section, "Trends in structure of American Agriculture," sets the pattern for what follows. He reviews some recent changes of the structure of agriculture "because they cast their shadows before them." Thus in this look into the future, Mr. Stewart commits himself in considerable degree to trajectory or trend prediction. That is, the direction and even rate of change are pretty well established and will continue somewhat as they are within the specified time period. For this purpose, it is a good tool.

These major changes that are basic to the projection are, (1) technology and management techniques replacing half the manpower of farms since 1930, while output per man-hour has increased threefold, (2) reduction in numbers of farms with increases in size, capitalization, specialization, and

increased dependence on income from other sources, (3) decrease in importance of nonpurchased relative to purchased inputs, (4) exodus of the labor force from the smaller farms, and (5) loss of almost 2 million farms in the past 20 years.

The next section deals with "factors influencing structure." Again, I shall attempt to summarize these factors briefly. They are the primary forces that shape the projections. They are that (1) economic forces outside agriculture will continue to have increasingly greater influence as it depends more upon outside sources of inputs and becomes a smaller factor in the total economy, (2) demand will increase about 25 percent for crops, 35 percent for dairy and poultry products, and 50 percent for meat animals, (3) this can be met by 5 million fewer acres in oil crops and food grains, 5 million more in cotton, and 15 million more in feed grains, (the acreage is available in the soil bank), and (4) a variety of miscellaneous factors will enter, including market and institutional restrictions, opportunities to exploit economies of scale, current and alternative production techniques, risk and uncertainty, fixity of production resources and use alternatives and the complex of individual farm and farmer characteristics.

With this background of history and present and projected forces, Mr. Stewart turns to his representative farms. He starts with dairy farms, and sums up his findings in the first sentence, "No drastic change in the organization and management of typical dairy farms seems likely by 1975." He says the size of dairy herds and production per cow will continue to increase, but family farms will continue to dominate the dairy industry.

In his discussion on "other livestock farms" he says adjustments may come through specialization, reductions in investment-output ratios, and substitution of capital for labor. With present technology, reductions in unit costs tend to level out within the potential size range of family farms. Of hogs, he says that there will be a marked tendency toward enterprises that produce 500 to 600 hogs on the hog-beef fattening farms in the Corn Belt. But whatever the size of the hog enterprise, its level of management is more important to unit costs than is the size.

In "cattle ranching," he sees less opportunity for change, aside from the prevailing trend to larger units. Market demands will force the rancher to concern himself more and more with a product whose kind, quality, and time on the market meet the specifications of large-scale retailing.

"Crop farms" present a different set of problems, yet the conclusions are similar. Restrictions imposed by demand and associated production-control programs come into play, and risk and uncertainty are stronger forces in the crop-farming areas. These farms, however, will continue to grow larger. The high degree of specialization that persists in these areas will continue.

In terms of changes and adjustments, what Mr. Stewart sees for these representative farms in the next 15 years is evolutionary rather than revolutionary.

Prof. Nelson's approach to credit is systematic and conventional, and well it might be. The business of loaning to agriculture, as well as lending activities in other segments of the economy, is carried on generally with someone else's money. It must pay a return to the owner of that money to induce him to make it available, protect its integrity so that it may be returned, and make a margin of profit for the lender. Other benefits are incidental or secondary. Thus the three R's of credit are the convention in the credit system.

Prof. Nelson sees no startling changes in the credit system, although some developments will occur. The use of agriculturally trained men in commercial banks is in itself an important step, an invention of long standing, but innovation has been delayed until economic forces have come into play. Production Credit Associations specialize in agricultural loans. They have not only been staffed by agriculturally trained people, but have stressed, with the Farmers Home Administration, budgeted loans. PCA's have become strong competitors for good borrowers, and commercial banks are revising their practices to meet this competition. Through its local loaning associations the Federal Land Bank introduced parallel changes into long-term or mortgage credit practices when it entered the field almost 20 years earlier.

"Package financing" has been demonstrated as workable by the Farmers Home Administration. It is a technique of sound finance which, as Prof. Nelson points out, is attractive for combinations of other financial institutions. The other developments he mentioned are just as important, particularly the whole field of insurance.

The representative farms were tested from the view point of two of the three R's. Consideration of returns was dismissed from the analysis because it is assumed that the total capital, equity and credit, required in each situation is that which will maximize returns from the farm. Repayment capacity and risk-bearing ability remain the questions that must be asked. Repayment capacity refers to the sufficiency of the income stream, gross income in some instances, and net income in others, to repay the loans.

Prof. Nelson says it is "evident" that repayment capacity for loan funds used to acquire production items will be much greater than for loan funds used to acquire capital items. This is based on the assumption that production costs are greater than net income available for savings. This is not quite universally evident. In practical operation of the credit system, the repayment responsibility for accumulated excessive production

credit can be shifted, by refinancing, from gross income to net savings, much as though the credit were originally exchanged for capital assets. The chief point to be made is that production credit has a prior claim over family living and savings.

Risk-bearing ability refers to the ability to withstand unpredictable losses and expenses and to continue farming. The amount needed is determined by the extent to which income may be lower than average and expenses higher and by the probable frequency of such deviations.

The analysis of the dairy farm shows adequate repayment capacity under average conditions, including ability to save at a rate commensurate with the growth projected by Mr. Stewart. However, the risk-bearing ability was not adequate. Prof. Nelson points out that growth does not occur in bad years, and by reducing living costs and deferring upkeep and payments on capital credit, the shortage can be reduced to $1,000. I would conclude that in planning a loan the lender would go through this analysis, and at this point decide that the application of the principles of the three R's shows the ratio of credit to equity to be too high and he would not make the loan. But Prof. Nelson looks to the credit system for relief after the dairy farmer experiences this adverse year. In effect, the lender may decide to take some small part of the risk. He points out also that loan insurance or income insurance could be appropriate means of alleviating these situations.

The other representative farms were found to have adequate repayment capacity. Those with high risk, like the Northern Plains wheat—small grain farm, would support a relatively smaller credit load.

At this point, I conclude that very little risk capital enters agriculture through commercial credit. Although some of it is now borne by insurance and probably more will be so borne by 1975, risk is borne primarily by the farmer's equity as a function of the entrepreneur. Integration transfers some part of the entrepreneurship to the integrator and with it some of the risk-bearing function. This is one of the forces that encourages integration.

In calculating repayment capacity, growth was included as a claim on income, and no representative farms were found to be lacking. This is an average concept. In a dynamic situation, many problems of equities will arise for those who have not the equities now and for farmers who will start farming mainly as successors or heirs of those who retire or die. Prof. Nelson offers three general solutions for representative farmers—growth, gifts and inheritance, and corporate business. Renting capital is an alternative to equity and credit, the merits of which are explored in considerable detail. Its use is increasing and, if acceptance is increased and terms improved, it has considerable potential.

New developments in credit and financing seem to be neither extensive nor revolutionary. I have noted that prospects for the representative farmers are similar, and that for some, they are even a little dismal. Why must this be so in these exciting times? I offer three reasons.

The first is the short time involved. From this year 1960, we are projecting to 1975, only 15 years. When 1975 first came into focus on what we might call the planning horizon, perhaps in the early 1950's, it was a long way off. Anything could happen in 25 years, and those who tried to guess were very daring. In 10 years, we have moved closer, observing directions and trends, and we think we see the forms more clearly. We are now so close that in 15 years changes for the representative farm will not be great barring some cataclysmic event.

The second is the subject of discussion, the representative farms. These are the great masses of farms, the modal group—all much alike and with a preponderance of average traits and the commonplace. Great events, changes, and adjustments do not occur on these farms. They occur at the margins and fringes, among the outstanding and exceptional people and situations. The masses follow more slowly, along a smoother path and without much excitement.

The third is that the representative farmer wants it this way. He does not want the exciting things to happen to him. He resists change and wants to continue the even tenor of his way. Often this requires considerable effort and probably the sacrificing of some of the economic return he is striving for. But, like most of the rest of us, he would be content to participate in the excitement of the times vicariously with the astronauts and remain earthbound himself.

DISCUSSION: THE FARM OF THE FUTURE

HOWARD W. OTTOSON
University of Nebraska

The sequence of organization and finance in the two papers which we have just heard is appropriate; undoubtedly, the financing of agriculture will pose new and interesting problems in the setting of the agriculture of 1975.

Mr. Stewart has outlined the assumptions which he makes concerning the factors affecting the organization of U. S. farms by 1975. His conclusions represent in general a projection of the trends of the past two decades with respect to size, enterprise combinations, and input structure.

Through no fault of his own Mr. Stewart labors under an important handicap in attempting to peer to the far reaches of his crystal ball. This handicap stems from the politics of agriculture.

We are at a threshold politically as far as agricultural policy is concerned. Regardless of which party wins the presidential election we can look for more drastic measures to be applied to agriculture in the next few years than we have seen since 1940. That is, it makes a difference whether we have a gigantic conservation reserve, or whether we have production quotas, or something else. Probably the most important variable which will affect Mr. Stewart's representative farms during the next few years, and the least ponderable, will be the political one.

Let us turn next to the specific organizational types discussed by Mr. Stewart concerning dairy production. I suspect that one change not represented by the specialized dairy farms which he has discussed will be associated with the continued movement of farmers out of agriculture. We are apt to see more and more area specialization in dairy production, and the demise of the small supplementary herd of, say, 10 cows. This will occur for the same reason that certain types of small enterprise poultry production have gone—simply because the market has rejected their product, or discounted it heavily pricewise. Dairy production will tend to be more heavily concentrated in specialized milk shed areas—on specialized farms.

I look for more drastic changes in livestock farming than does Mr. Stewart, and specifically toward firm specialization. First, we do not know enough about the costs of specialized factory type of livestock production as compared to even large-scale family operations carried on in conjunction with crop enterprises. When we note such ratios as 1000 head of beef feeders and more per man in Colorado feed lots we may be pardoned for letting our imaginations be stimulated somewhat. Second, specialization also implies scale considerations in selling livestock, in buying of animals, feed and other inputs, and other types of specialized managerial tasks.

In fact, though it may not necessarily happen in 15 years, I look for a gradual breaking away of livestock production from crop production, with livestock production tending to be more and more specialized, of an assembly line nature, depending more heavily on purchased materials and hired labor, and marketing a more and more uniform product, in many cases according to specifications, and under contract. Greater stability of market prices will speed this tendency; or, perhaps we will see more price formation by negotiation. If this comes about, family farming as we know it will assume more of a cash crop nature, with expanded scale, and with cash crops being sold to the specialized livestock enterprises. At the time that the number of commercial farms goes below two million we may be seeing more drastic organizational shifts in American farming. The assumption of continued technological development in production, technological developments in marketing, with consumers

apparently willing to pay the higher food bill which the latter entail, and greater managerial training and specialization seems to make them evitable. Just as the 40's and the 50's have been the "age of the machine" in farming, so the 60's and the 70's may be the "age of the manager." Thus, without feeling either alarmed or joyful at the prospect, I feel that the situation concerning the family farm in the future is organizationally more dynamic than does Mr. Stewart.

Turning to the second paper, Dr. Nelson has outlined some of the developments which are even now casting their shadows in the farm credit field. There seems to be a new spirit of innovation in the farm credit field which was not evident even as recently as five years ago, both among cooperative and private lenders. Why this is true is not entirely clear. but the adoption of intermediate term loans by Production Credit Associations, or the discussion of "package credit" by commercial bankers is evidence of the trend. Perhaps banking is more competitive, or perhaps bankers have also been caught up in the spirit of change which seems to permeate all of agriculture.

A key question in Nelson's paper was this one: "What are the chances of representative farmers having these amounts of capital in 1975" He is not completely hopeful that the traditional sources of capital—saving, and private borrowing—will do the job. Thus he turns to the corporate form as an alternative means of securing the greater amounts of capital which the representative farm will be using. Incorporation will be used more and more by families as a farm transfer device. It should also open the door to the participation of non-family members in the financing of family-operated farms. Finally, it may logically be attractive to the specialized, large scale, concentrated types of "meat" factories which I have suggested as an important future farm type. These may be operated by farm families, or they may be simply organized by people with money to invest, relying on hired management and labor, and depending on the corporate device to attract additional capital.

Nelson also suggests a greater reliance on renting as a source of additional capital. I do not quarrel with this. However, I am interested in some of the things which he said were outside the scope of his paper with respect to renting. It seems to me that these are most important. Indulging in a far look for a moment, it is likely that we may see some far-reaching changes in the tenure arrangement which we call renting, which will be brought about because of the increasing complexity of managerial decision-making, and the problems of financing the agriculture of a future day. Is it not possible that the management companies which we know today may assume a heavier burden of financing the farms with which they are associated? And, in this process, may not a larger share of managerial decisions, and risk taking, be absorbed by them? Where does this

leave tenants? Obviously they will be less like managers, and more like foremen and laborers. They will still make operating decisions. However, they may be freed in large measure from the burden of financing. They may, if qualified, perform specialized managerial functions in connection with the horizontally integrated firms of which they are a part, as for example buying all of the steer calves for all of the farms which are under the control of the management firm. And they may not be share tenants, but rather may be on a wage-plus-share-of-the-profits basis.

I hope that Stewart and Nelson will forgive me for pushing them into some paths which they did not plan to tread. But, by 1975, the term "representative farms" may denote other differences than those of enterprise structure, differences which will derive from some of the considerations of ownership, entry, and finance which they chose not to cover in their papers.

MEASURING INPUT CHANGES IN AGRICULTURE

CHAIRMAN: VERNON W. RUTTAN, PURDUE UNIVERSITY

THE NEW USDA INDEX OF INPUTS

GLEN T. BARTON AND DONALD D. DUROST
Agricultural Research Service, USDA

I. *Introduction*

THE TECHNOLOGICAL revolution in farming during the last two decades has been described often and in many ways. The upsurge in farm output has gone hand in hand with sharp rises in production per man-hour, per acre, and per animal. The use of nonfarm inputs has expanded phenomenally as farms have become more mechanized and farmers have made increasingly greater use of chemical fertilizers and a host of other industrially produced goods. Volume of farm output has risen greatly, despite a drastic reduction in use of labor on farms and virtually no change in amount of land in farms.

The nature and magnitude of the technological revolution in farming and various facets of our increases in agricultural productivity have been well documented by previously available statistical measures. Until recently, however, our USDA measures of productivity have been chiefly "partial" measures in that they have related changes in total farm output to changes in important individual inputs. Nor have we had an adequate clue as to the trend in the volume and composition of total resources used in farm production.

In view of the sharply divergent trends in inputs of farm labor, farmland, and nonfarm inputs, there is need for measures of change in aggregate inputs and in over-all productivity of agriculture. This objective has been met to a considerable extent by the new USDA index of total inputs. Some of the major series on aggregate inputs and productivity were published in the *1960 Agricultural Outlook Chart Book,* the *1960 Economic Report of the President,* and the 1960 issue of *Changes in Farm Production and Efficiency.*[1]

The trend of the new index series underscores the characterization of changes in agriculture over the last 2 decades as a technological revolution. Farm output rose by 50 percent from 1940 to 1958 with little change

[1] The results of the research on aggregate inputs are incorporated in an unpublished manuscript, "Productivity of Agriculture—United States, 1870-1958" by Ralph A. Loomis and Glen T. Barton. The authors of this paper have drawn freely on data and analysis presented in it.

in total volume of inputs used. The relative stability of aggregate inputs resulted because the drop in labor inputs was great enough to counterbalance the large increase in nonfarm inputs. These, and other results of analysis of the new data have important policy implications. Accordingly, it is desirable to understand the nature of the new index series and, more importantly, to appraise critically the methods and data used in the development of this measure of aggregate inputs. These are the purposes of this paper.

II. *Concepts Used*

A major objective in developing the new index was to provide a measure of physical volume of total inputs used in farming consistent with the coverage and concept of the index of farm output.[2]

The farm output series is a measure of "gross" output of agriculture in that no deductions are made for the value of intermediate products used in production as is done in calculating gross national product. In measuring farm output, all of agriculture is regarded as one large farm.[3] The input series likewise was designed as a gross measure for one large farm. To be consistent with the concept of farm output, farm value of interfarm transfers of feed, seed, and livestock was excluded. However, nonfarm inputs of transportation, fabrication, and so on, associated with farmers' purchases of these items were included as inputs.

The new series is a measure of physical volume in that price weights are held constant and only the quantity of inputs is allowed to vary from year to year.[4] The series measures changes in volume of "physical" inputs in the restricted sense that it includes only those inputs having an economic value.

The series is designed to measure annual inputs associated with the yearly output of farm products. Consequently, annual input services of capital items, such as farm machinery, were measured in terms of depreciation and interest on investment.

The new measure includes only the tangible inputs committed to agricultural production by farmers. In general, this means that the inputs measured are the ones that are subject to farmers' control and decision regarding inclusion in the production process. The important capital inputs associated with public investments in research, education, health,

[2] For results of John W. Kendrick's study of changes in over-all productivity in which combined inputs of labor and tangible capital are related to GNP, see Solomon Fabricant, "Basic Facts on Productivity Change," Occas. Paper 63, Natl. Bu. Econ. Res., Inc., 1959.

[3] For a detailed description of the index of farm output see Volume II of Agr. Hb. No. 118, *Major Statistical Series of the U. S. Department of Agriculture.*

[4] Wherever possible, quantities of inputs were multiplied by weight-period prices. In other instances, value of inputs in current dollars was deflated by an appropriate index of prices.

transportation, and so on, are excluded from the input measure. Inputs from private investments of this kind are covered to the extent that they are reflected in the input prices used as weights.

Relative weights per unit of the various inputs included were established by the average prices in the weight period used. Thus market prices paid by farmers for inputs formed the basic weights. Operator and family labor was valued at wage rates paid hired workers. Other nonpurchased inputs were assigned the same price per unit as was paid for similar inputs purchased. The mortgage rate of interest was applied to the value of all farmland and service buildings in the weight period to derive an interest charge for real estate. This interest charge was varied over time in proportion to changes in the volume of real estate as measured in constant dollars.

Marginal productivities of inputs in the weight period are reflected in the weights only to the extent that marginal productivities are reflected in the market prices used.

The new index of over-all productivity measures net changes in the aggregate output-input ratio owing to advances in farm technology, changes in scale and in degree of specialization, adjustments toward a more optimum combination of resources, variations in weather, and other factors. The productivity measure, therefore, should not be regarded solely as an index of changes in farm technology.

III. *Coverage of the Input Series*

In the process of calculating total farm inputs, six major groups of inputs are computed. These groups and the kinds of data included in each are as follows:

Farm labor includes the total man-hours of hired and operator and family labor used in agricultural production.

Farm real estate includes interest on land and service buildings; depreciation, repairs, and accidental damage on service buildings; and grazing fees on land not in farms but included in farm operations. Operator dwellings are excluded as a production input.

Mechanical power and machinery includes interest on the inventory value of automobiles, trucks, tractors, and other farm machinery; depreciation, repairs, parts, and tires for these items; license and insurance on automobiles and motor-trucks; fuel, oil, and electricity used for production; and blacksmithing, hardware, small hand tools, and harness and saddlery. All inputs applicable to automobiles include only the production portion—50 percent for the years 1942-45 and 40 percent for all other years.

Fertilizer and lime includes fertilizer plant nutrients and lime applied on farms.

Feed, seed, and livestock includes that portion of feed, seed, and livestock purchases resulting from activities of the nonfarm sector of the economy; for example, feed and seed processing, transportation, chicks produced by commercial hatcheries, marketing service charges, and so on.

Miscellaneous inputs include interest on livestock and crop inventories, on operating capital, and on horse and mule inventory; charges for livestock marketing and milk hauling; expenditures for containers; fire, wind and crop-hail insurance; greenhouse and nursery supplies; binding materials; pesticides; irrigation operation and maintenance; sorgo and sugarcane tolls; veterinary services; dairy supplies; telephone (production portion); ginning charges; and real estate and personal property taxes.

Machinery inputs originating from commercial custom work on farms are not included in total inputs owing to the lack of available data, but custom work done by farmers is included.

The indexes are computed on a United States basis only, and are available annually from 1910 to date. Indexes of total inputs and productivity for years prior to 1910 were calculated for the United States at decade intervals back to 1870.

IV. *Problems of Measurement*

The chief problems in measuring total inputs can be grouped into three broad categories: (1) Quality and completeness of basic data, (2) difficulties of aggregation, and (3) calculation of capital inputs.

Owing to limitations of research resources, major dependence was placed on readily available secondary data in constructing the input series. For example, practically all of the basic data on purchased inputs came from the estimates of production expenses of farm operators made by AMS, and labor inputs were based on the ARS series on man-hours of farm labor.

Obviously, improvement in the quality and completeness of the data on production expenses, man-hour inputs, and so on, would in turn improve the input measure. However, enumeration of various possible means of improving the quality and completeness of these data is beyond the scope of this paper. Rather we shall appraise some of the techniques employed in using available data and in constructing the input series, with chief focus on the period since 1940.

The weighting system

Selection of a weighting system for the input series posed difficult problems in view of the divergent trends in quantities and prices of the various inputs. Especially evident was a substantial increase in the relative price of farm labor, which started near the beginning of World War II. Later, a sharp decrease in inputs of farm labor set in.

TABLE 1. EFFECTS OF DIFFERENT WEIGHTING PERIODS ON RELATIVE IMPORTANCE OF INPUT GROUPS, 1947–49

Input group	Percentage of total inputs using as weights—			
	1910–14 prices	1935–39 prices	1947–49 prices	1957 prices
Farm labor	23.5	30.0	44.9	46.8
Farm real estate	22.6	16.5	14.3	17.1
Mechanical power and machinery	24.3	23.3	16.0	16.8
Fertilizer and lime	6.8	6.3	3.3	2.6
Feed, seed, and livestock purchases[1]	8.7	9.5	8.2	5.6
Miscellaneous	14.1	14.4	13.3	11.1
Total	100.0	100.0	100.0	100.0

[1] Nonfarm inputs only; excludes value of interfarm transactions.

The importance of the choice of price-weight periods was recognized at the outset. Accordingly, considerable effort was devoted to appraisal of changes in the relative prices of inputs and of effects of alternative price-weight periods on an aggregate index of selected inputs.[5] The weighting system was chosen on the basis of the results of these appraisals. Effects of alternative price weights on the index of inputs were reappraised after completion of the final input calculations. The conclusions of the preliminary testing were generally confirmed.

The importance of choice of price-weight period on input measurement is underscored by the data in table 1. Farm labor accounts for nearly half of the total inputs during 1947-49 if inputs are weighted by 1957 prices. Labor is only half as important, relatively, if 1910-14 prices are used as weights. Correspondingly wide variations occur for some of the other input groups.

Use of alternative price weights gives widely differing amounts of change in total inputs over the last two decades (table 2). If 1957 price weights are used, the "answer" is that the total volume of inputs was es-

TABLE 2. EFFECTS OF DIFFERENT WEIGHTING PERIODS ON INDEX OF TOTAL INPUTS, SPECIFIED PERIODS, 1940–58

Price-weight period	1940–42	1947–49	1956–58	Change, 1940–42 to 1956–58
	1947–49=100			*Percent*
1910–14	89	100	115	29
1935–39	90	100	111	23
1947–49	98	100	101	3
1957	100	100	99	−1

[5] See "Effect of Weight-Period Selection on Measurement of Agricultural Production Inputs," by Ralph A. Loomis, *Agr. Econ. Res.*, Vol. 9, No. 4, Oct. 1957.

sentially the same in 1940-42, 1947-49, and 1956-58. If 1910-14 price weights are used, total inputs are shown to increase by nearly 30 percent from 1940-42 to 1956-58, and by 15 percent, or nearly as much as the increase in farm output, from 1947-49 to 1956-58.

Indexes of total inputs for the period 1910-39 resulting from use of 1910-14, 1935-39, and 1947-49 price weights are shown in table 3. Here there is much greater agreement in results than was true in the testing of alternative price weights for the 1940-58 period.

These data indicate the extent to which the problem of weight-correlation bias may plague the index maker.[6] The data also emphasize that the

TABLE 3. EFFECTS OF DIFFERENT WEIGHTING PERIODS ON INDEX OF TOTAL INPUTS, SPECIFIED PERIODS, 1910–39

Price-weight period	1910–14	1915–19	1920–24	1925–29	1930–34	1935–39	Change	
							1910–14 to 1920–24	1920–24 to 1935–39
	1935–39 = 100						*Percent*	
1910–14	88	94	99	104	101	100	12	1
1935–39	94	98	101	106	101	100	7	−1
1947–49	98	103	104	107	103	100	6	−4

final choice of weights is arbitrary. Consequently, it is imperative that the index maker draw heavily on analyses and facts that will insure a defensible, though arbitrary, decision.

The data in the first 3 tables show clearly the difference between the periods preceding and following 1940 with respect to the effect of weight-correlation bias on the index of aggregate inputs. The bulk of the difference is associated with the labor input. Although the amount of labor used on farms has trended downward since World War I, the rate of decline was greatly accelerated following World War II. About the time of World War II, also, the relative price of labor rose sharply.

Use of the higher relative weights for labor, rather than the lower prewar weights, gives a substantial downward "bias" to the index of total inputs for the period after 1940, when labor inputs decreased rapidly. The combination of relative prices and changes in quantities of inputs of mechanical power and machinery also contributed a downward bias to the total index in this period. Power and machinery inputs increased rapidly after 1940, and the use of the lower postwar relative weights for

[6] For a discussion of weight-correlation bias and of other problems in constructing index numbers, see "Research in Agricultural Index Numbers," Soc. Sci. Res. Coun. Bul. No. 10, March 1938.

these inputs held down the rise in the index of total inputs compared with the use of the higher relative weights of the prewar period.

The effects of alternative price weights on the index of total inputs for the period preceding 1940 were more moderate. The chief reason for this was that the quantities of the various inputs, including labor, changed at a much slower rate than in the period following 1940, and thus cushioned the effect of widely different relative weights on the aggregate index.

In constructing the input series, 1947-49 prices were used as weights in 1940 and subsequent years, and 1935-39 prices were used for 1939 and prior years. The final index of total inputs, with a reference base of 1947-49 as 100, was spliced through use of overlapping calculations for 1940. Several factors governed the final decisions on a weighting system. Analysis of long-term trends in relative prices of inputs pointed to a sharp increase in the relative price of labor beginning about 1940. Other analysis and appraisal indicated that relative prices of inputs in 1947-49 were about as typical of the period since 1940 as were relative prices in alternative weight periods during the last two decades.

Similar reasoning led to the choice of 1935-39 weights for the period before 1940. The decision for this earlier period was less difficult owing to the narrow range in effects of alternative weights on the index of total inputs.

Another important factor in the final decision was the fact that the weight periods and splicing system chosen were the same as were used in constructing the index of farm output.

Plans are to review and appraise the weighting system periodically. In the meantime, users of the new series should recognize the arbitrary, though defensible, choice of weights. Also, users should be warned of the limitation on use of the data for long-time comparisons that is imposed by the use of split weight periods in constructing the final indexes of inputs.

Machinery inputs

Inputs of mechanical power and machinery accounted for 16 percent of all inputs used in agriculture in 1947-49. Depreciation and interest charges made up more than 40 percent of these machinery inputs. For the most part, the remaining inputs in the group are those associated with cash expenditures for such things as fuel and repairs.

There are several techniques of calculating depreciation, such as the declining-balance, straight-line, and sinking-fund methods. Decisions need to be made also regarding the length of life or rate of depreciation to be used in the calculations. Interest charges on capital investment will vary also according to the choices made as to depreciation method and length of life.[7]

[7] As these choices may affect greatly the estimates of volume or stock of capital,

TABLE 4. INPUTS OF DEPRECIATION AND INTEREST FOR A GIVEN MACHINE, USING ALTERNATIVE METHODS OF CALCULATING DEPRECIATION[1]

Item	Unit	Year of life					10-year total
		2d	4th	6th	8th	10th	
Declining-balance method:							
10-year life:							
Depreciation[2]	Dollar	192	105	58	32	17	950
Interest	Do.	44	24	13	7	4	218
Total	Do.	236	129	71	39	21	1168
Percentage of 2d year total	Percent	100	55	30	17	9	—
Stock beginning of year	Dollar	740	405	222	122	67	—
20-year life:							
Depreciation[2]	Dollar	120	89	66	49	36	779
Interest	Do.	52	38	28	21	15	334
Total	Do.	172	127	94	70	51	1113
Percentage of 2d year total	Percent	100	74	55	41	30	—
Stock beginning of year	Dollar	860	636	470	348	257	—
Straight-line method:							
10-year life:							
Depreciation[3]	Dollar	100	100	100	100	100	1000
Interest	Do.	54	42	30	18	6	330
Total	Do.	154	142	130	118	106	1330
Percentage of 2d year total	Percent	100	92	84	77	69	—
Stock beginning of year	Dollar	900	700	500	300	100	—
20-year life:							
Depreciation[3]	Dollar	50	50	50	50	50	500
Interest	Do.	57	51	45	39	33	465
Total	Do.	107	101	95	89	83	965
Percentage of 2d year total	Percent	100	94	89	83	78	—
Stock beginning of year	Dollar	950	850	750	650	550	—

[1] Assumes purchase for $1,000 and 6-percent rate of interest.
[2] Assumes 5-percent junk value at end of life.
[3] Assumes no junk value.

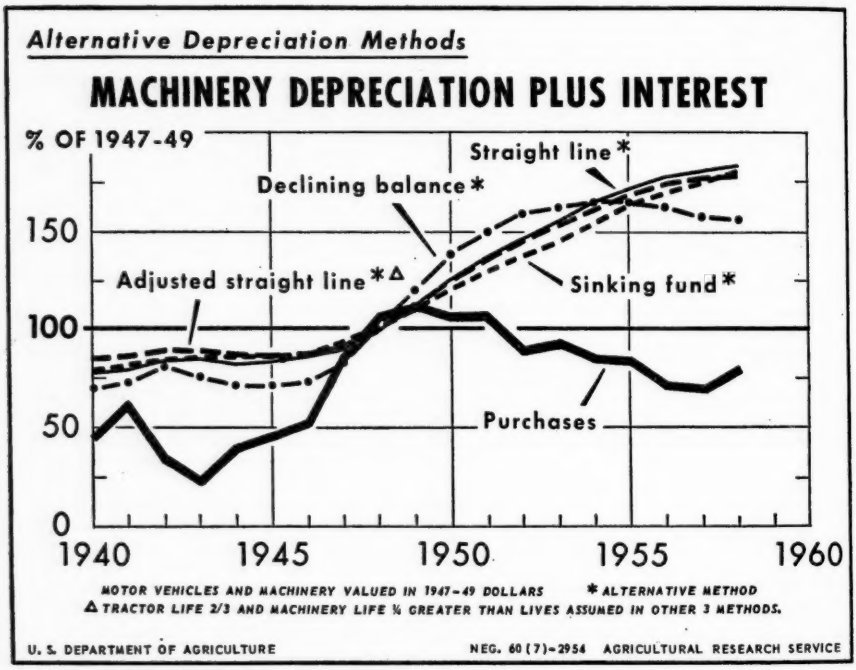
The depreciation estimates used in calculating machinery inputs are those calculated by the Agricultural Marketing Service through the declining-balance method. The rates of depreciation assumed result in a total charge-off of approximately 95 percent of the total value of machinery over a period of years estimated as the useful life of the capital item. The remaining 5 percent represents scrap value. The annual depreciation rates used for recent years are: Automobiles 22 percent, motortrucks 21 percent, tractors 18.5 percent, and other machinery and equipment 14 percent.

Interest on capital invested in farm machinery was calculated by mul-

the amount of interest charged may be correspondingly affected. A detailed analysis of the effects of alternative methods of calculating depreciation on estimates of capital stocks is beyond the scope of this paper.

tiplying the constant dollar value of inventories by the commerical bank short-term interest rate in the price-weight period.

In considering alternative methods and rates of calculating depreciation, the trend or flow of combined inputs of depreciation and interest is the important factor to be considered. Theoretical flow patterns of depreciation plus interest under alternative methods and rates of depreciation are shown in table 4. When the rate of depreciation is decreased



(assumed length of life increased), the increase in interest on stocks partly compensates for the decrease in volume of depreciation. If the interest rate were increased, the compensating effect of interest on stock would be even greater.

The over-all differences in trend are more pronounced when methods of depreciation are compared. Under the declining-balance method, depreciation is rapid during the early years of life of a machine, and the over-all trend of depreciation plus interest is sharply downward. Straight-line depreciation results in a more moderate downward trend owing to equal increments of depreciation throughout the useful life of the machine. A third method, not shown in table 4, is the equal payment or sinking-fund method. The over-all trend in this case, as the name implies, would be level throughout the life of an individual machine.

The comparison of alternative methods thus far has been for the case

of a single machine. To test the effects of alternative methods on the input index, variations in farmers' purchases of machinery over time must be taken into account. A comparison of changes in volume of machinery inputs resulting from four alternative methods of computing depreciation is shown in the accompanying chart. The over-all trend of depreciation plus interest is essentially the same for three of the methods tested for the period 1940-58. The over-all trend for the declining-balance method varies somewhat from that for the other methods. It is more sensitive to the cyclical pattern of purchases than are the alternative methods.

As depreciation plus interest on machinery accounted for less than 7 percent of total inputs in 1947-49, a substantial change in these machinery

TABLE 5. EFFECTS OF DIFFERENT METHODS OF CALCULATING MACHINERY DEPRECIATION ON INDEX OF TOTAL INPUTS, SPECIFIED PERIODS, 1940–58

Depreciation method	1940–42	1947–49	1956–58	Change, 1940–42 to 1956–58
	1947–49=100			*Percent*
Declining balance[1]	98	100	101	3
Straight-line[1]	99	100	102	3
Adjusted straight-line[2]	99	100	102	3
Sinking fund[1]	99	100	102	3

[1] The AMS inferred length of life used.
[2] Life of tractors increased $\frac{2}{3}$, and life of other machinery $\frac{1}{4}$.

inputs would be required to affect greatly the index of total inputs. The data in table 5 show the indexes of total inputs that result when depreciation is computed by each of the four alternative methods. When the declining-balance method of depreciation is used, total inputs are 1 percent less in 1940-42 and 1956-58 than total inputs estimated on the basis of each of the other three alternative methods. This difference undoubtedly is less than the margin of error in the basic data. Thus results of alternative methods of computing depreciation affect the index of total inputs very little. However, when the input index is revised, consideration will be given to adoption of an alternative method of computing depreciation.[8]

Real estate inputs

Measurement of inputs of real estate was based on the concept of annual flow of real estate services, in contrast to the concept of stock of capital goods used in measuring volume of real estate. The bulk of the real estate input consists of an interest charge on the constant-dollar in-

[8] For a further discussion of issues involved in choosing a method of depreciation and the effect of choice of method on estimates of capital stock, see Zvi Griliches, "The Demand for a Durable Input: Farm Tractors in the United States, 1921-57" in Harberger (ed.): *The Demand for Durable Goods* (Univ. of Chicago Press, 1960).

vestment in land and buildings exclusive of operators' dwellings. Consequently, in view of the relative importance of the real estate item, any errors in measurement of changes in volume of real estate presumably could have an important effect on the index of total inputs. Recent analysis indicates that the growth in volume of real estate may have been greater than the growth reflected in the data used in constructing the index of total inputs.[9]

Recent revisions in the measure of volume of real estate consisted chiefly of an improvement in the basis for eliminating value of operator dwellings, and the incorporation of data to reflect more adequately

TABLE 6. EFFECTS OF ALTERNATIVE ESTIMATES OF REAL ESTATE INPUTS ON INDEX OF TOTAL INPUTS, SPECIFIED PERIODS, 1940–58

Item	1940–42	1947–49	1956–58	Change, 1940–42 to 1956–58
	1947–49=100			*Percent*
Estimates used in published series:				
Real estate inputs	97	100	105	8
Total inputs	98	100	101	3
Revised estimates:				
Real estate inputs	94	100	105	12
Total inputs	98	100	101	3

changes in acreage of land in farms over the last two decades. The data used in the published series on production inputs reflect an increase of 8 percent in volume of real estate inputs from 1940-42 to 1956-58, whereas the revised estimates suggest an increase of 12 percent (table 6). Use of the revised estimates of real estate inputs would change the index of total production inputs by less than 1 percent.[10]

Substantial changes in the estimates of real estate inputs are necessary if the index of total inputs is to be revised significantly. This is not to deny, however, the importance of future efforts to improve the data on inputs of real estate. Especially needed is an annual "capital account" for real estate which would reflect changes in quality of real estate owing to shifts in the kinds of land used in farming, net public and private investments in land improvements, allowances for land depletion, and improved estimates of net changes in inventory volume of service buildings.

[9] See "Technology and Changes in the Capital Structure of Agriculture," by William H. Scofield and Glen T. Barton (paper presented at the Symposium on Capital and Credit Problems in a Changing Agriculture, Knoxville, Tenn., March 30, 1960).

[10] Even if one were to assume that the volume of real estate inputs increased by 25 percent from 1940-42 to 1956-58, the resulting increase in total production inputs over the period would be only 5 percent as compared with the present estimate of 3 percent.

Other measurement problems

Space limitations do not permit an exhaustive analysis of all measurement problems encountered in the construction of the new USDA index of inputs. A few of the more important additional problems will be noted, however.

During the 1947-49 weight period, the total residual returns to nonpurchased inputs of labor, land, and capital exceeded the calculated total returns to these factors based on market prices paid for similar inputs purchased. Although arbitrary allocations would be involved, residual returns per unit rather than market prices of nonpurchased inputs might have been used as weights. Use of residual returns for valuing inputs of operator and family labor would increase the relative weight of labor and result in less rise in the index of total inputs. This downward pressure on the input index, however, would be counterbalanced, partly at least, by the greater relative weight given to nonpurchased capital inputs.

No direct weight was given to the management input, nor was any attempt made to measure the quantity of this input. The impact on the index of total inputs of this omission is conjectural.

One gross approach to measurement and pricing of the management input is possible. Fees charged by professional farm management companies provide a means of identifying the market price of management. Lowell A. Hodam, in the October 1956 issue of the *Journal of the American Society of Farm Managers and Rural Appraisers,* reported on fees charged by a sample of companies for management services. The prevalent rate was "7 percent of landlord's gross." The proportion of the gross of the entire farm would be half or less of the 7-percent rate.

For testing purposes, 3 percent, and alternatively 5 percent, of the constant-dollar value of farm output each year was regarded as a management input. Inclusion of management inputs based on the 3-percent assumption did not change the index of total inputs for 1940-42 and 1956-58. Use of the 5-percent assumption would raise the index of total inputs for 1956-58 by about 1 percent.

Problems were encountered also in measuring aggregate inputs of fertilizer. The weighting system used does not allow for changes over time in the relative proportion of nitrogen, phosphorus, and potassium in total plant nutrients. Analysis indicates, however, that the assignment of separate price weights to the three major fertilizer elements would have little effect on the index of fertilizer inputs and consequently on the index of total inputs. The increase in fertilizer inputs in the last three decades may be understated by as much as 5 percent because of the failure to use separate price weights for each major plant nutrient.

Conclusions

Within the limitations of available data and the concepts employed, the conclusion that the volume of total inputs used in agriculture has changed little over the last two decades seems defensible. The appraisals of methods used in calculating inputs of machinery and of real estate, as well as consideration of other measurement problems, indicate that our aggregation of input data has been reasonably accurate.

The major limitation on the accuracy of the input series is imposed by the arbitrary selection of price weights. We have not been naive enough to assume that we could solve the problem of weight-correlation bias. However, our arbitrary choice of weighting systems seems reasonable. Periodic reappraisal of the weighting system will help to insure the continued use of defensible weights.

When research resources permit, plans are to develop indexes of inputs for each of the major farm production regions. The results of this undertaking may provide a basis for further improvement in the input series for United States agriculture as a whole.

MEASURING INPUTS IN AGRICULTURE: A CRITICAL SURVEY*

Zvi Griliches
National Bureau of Economic Research and University of Chicago

1. *Introduction*

1.1 In this preliminary report, the measurement of inputs in agriculture is discussed solely from the point of view of aggregate productivity analysis. Statistical series that are criticized here may be perfectly adequate for their original purposes and no reflection is intended on their "producers." The comments are necessarily brief and selective. Some of the conclusions may appear extreme, because they are stated without the detailed explanation and qualification that will be possible in the full report of the study.

1.2 The discussion is limited mainly to conceptual problems, and ignores the important statistical problems of sources of data, randomness, size of sample, and so on. Most of the attention is paid to two problems: the changing quality of agricultural inputs and the measurement of the services and value of capital equipment on farms.

2. *The Changing Quality of Agricultural Inputs*

2.1 There is little doubt that the quality of most agricultural inputs has changed substantially during the last 20 years. Tractors have increased in size and versatility; the plant nutrient content of fertilizers has gone up by about 50 percent; and there has been an increase in the educational level of the farm labor force. It is clear that we want our input measures to take some of these changes into account, e.g., changes in the average capacity of farm trucks. Whether or not we want the input measures to cover all possible quality changes is a semantic rather than substantive issue. Hybrid seed corn can be viewed either as an improvement in the quality of seed or as "technical change." Since we are interested in explaining the growth of agricultural output, it does not matter much whether we put it into the "input change" category or the "productivity change" category as long as we put it somewhere and know where it is. But it matters very much that we should try to measure it the best we can since it is such an important source of output change.

2.2 Since many of our input series are based on deflated expenditure series, if the deflators fail to take quality change into account, so will also the resulting "constant price" estimates. All of the deflators used for these

* A preliminary report on a study supported by a National Science Foundation grant. A full report on the study will be published at a later date. This preliminary report has not been approved for publication by the Board of Directors of the National Bureau of Economic Research.

purposes have been based on USDA collected price statistics and are components or a recombination of components of the Prices Paid Index. While most price indexes do poorly as far as quality change is concerned, the Prices Paid by Farmers Index has been especially affected by the official USDA position on these matters. The USDA, instead of recognizing that it is a difficult problem with no perfect solution, but one worth fighting for, has taken the position that nothing *should* be done about it, that it is not *desirable* to hold quality constant when pricing items bought by farmers, and thus has made the quality change problem much more serious for the USDA Prices Paid Index than is the case for similar indexes in other sectors of the economy.[1] As the result of this position, most commodity definitions in the Prices Paid Index are quite vague, e.g. the quality or brand priced is the one "most commonly bought by farmers." Also, the insistence on pricing items with all "the customarily bought attachments" could result in a substantial bias in the USDA estimates of prices paid for more complicated pieces of machinery. Since the USDA is fortunately not completely consistent on this matter, a shift from Chevrolets to Cadillacs will not show up in the index, but if farmers were to shift to automatic transmissions, power steering, or built-in air conditioning, those shifts would show up as an increase in the price paid by farmers for automobiles.

That this is a serious problem is indicated by a comparison of the trend of USDA and BLS (Wholesale Price Index) prices for comparable items presented in Table 1. For most items, the USDA prices have gone up more than comparable prices in the WPI. The difference is small or negative for relatively simple items such as moldboard plows, grain drills, hammer mills, and wagons, but is quite large for more complicated pieces of equipment such as tractors, cornpickers and milking machines.[2] It is true that the USDA prices are "retail" whereas the WPI prices are "wholesale," but for this to explain the consistently higher USDA prices dealer markups should have risen substantially. Considering that 1947-49 were still relatively "tight" postwar years and that by 1958 discounting had become the rule rather than the exception, dealer margins probably narrowed rather than widened during this period. If so, the figures in Table 1 may actually underestimate the upward drift in USDA prices due to incomplete commodity specifications. Thus, about a quarter of the rise in specified USDA prices could be due to a shift to higher quality and "more attachment" machines rather than to any real price change.

Index makers and economists have by and large accepted the assumption that if an item has a separate price (at least for awhile), and if peo-

[1] See USDA Agr. Hb. 118, Vol. 1, pp. 32-33.

[2] For automobiles the USDA showed in 1958 an increase of about 56 percent in their price since 1947-49. In the same time period, the Consumer Price Index of new cars, which prices about the same models as the USDA, rose only 34 percent.

ple are buying it, it must be worth what they are paying for it, at least on the average. Thus the appearance of automatic transmissions on the market at $200 extra will not raise the price of automobiles in the Consumer Price Index or Wholesale Price Index even though eventually almost all cars are sold with it and their base price incorporates it as "standard equipment."

TABLE 1. A COMPARISON OF BLS (WPI) AND USDA PRICES FOR COMPARABLE FARM MACHINERY ITEMS IN 1958

Machine	Price Index in 1958 1947–49 = 100	
	WPI[a]	USDA[b]
Tractor, wheel, 30–39 belt h.p.	127	148
Plow, moldboard, two-bottom	159	142
Plow, moldboard, three-bottom	177	153
Disc harrows, tandem	140	161
Cultivator, 2-row, mounted	147	162
Manure spreader, 2 wheel rubber tires	145	165
Corn planter, 2 rows	153	186
Grain drill, 20-tube	148	147
Mower	145	169
Hay rake, side delivery	156	207
Combine, self-propelled, 12 ft.	140	147
Combine, 5–6 ft. PTO	154	161
Cornpicker, 2-row	129	174
Hammer mill	158	156
Milking machines	119	135
Wagons	126	129
Power sprayer	144	132
Weighted Average[c]	139	149

[a] *Wholesale Prices and Price Indexes*, 1958, Bu. Labor Stat. Bul. No. 1257, July 1959.
[b] USDA, *Agricultural Statistics*, 1958 and 1959, and various issues of USDA, *Agricultural Prices*.
[c] Weighted by USDA Index of Prices Paid 1955 weights. From B. R. Stauber, et al., "The January 1959 Revision of the Price Indexes," *Agr. Econ. Res.*, April–July 1959.

The USDA Prices Paid Index could be substantially improved if it were to accept the same standards and methods of commodity specification and chaining used in the construction of the CPI and WPI. These indexes at least try to adjust for those quality changes to which a price can be attached.

2.3 Unfortunately, only few of the observed quality changes come in discrete lumps with an attached price tag. Most of the changes are gradual, are not priced separately, and are likely to be missed even by relatively well "specified" indexes such as the CPI. Nevertheless, not all is hopeless. Many dimensions of quality change can be quantified (e.g. horsepower, weight, top speed, durability, fuel consumption per unit of output for tractors); a variety of models with different specifications can be observed being sold at different prices; using multiple regression techniques on these data one can derive implicit prices per unit of the chosen

additional dimension of the commodity; and armed with these "prices" one can proceed to adjust the observed price per "average item" for the changes that have occurred in its specification. There are many technical problems to be solved, e.g. the use of beginning versus end period prices, but the main idea is quite simple: Derive implicit specification prices from cross-sectional data on the price of various "models" of the particular item and use these in pricing the time series specification change in the chosen (average or representative) item.

An example of the possible magnitude of such an adjustment is provided by an analysis of U.S. passenger car prices and specifications in the periods 1937-50 and 1950-59.[3] It appears that "quality change" accounted for between one third and two thirds of the actual change in list prices of Chevrolet, Ford, and Plymouth 4-door passenger sedans during these periods. The relative importance of quality change appears to have been substantially greater in the more recent 1950-59 period than during the 1937-50 period. As compared to the USDA price index for automobiles, the index of list prices adjusted for quality change rose by about 30 percent less from 1937 to 1950 and by about 40 or more percent less from 1950 to 1959. Since discounting has become prominent during the last few years and is presumably caught by the USDA, the "true" difference between these indexes may be even greater. Thus, the use of price data collected with very little control over what is being priced, and the lack of almost any adjustment for quality change in the official price indexes, has probably biased seriously some of the agricultural inputs series.

2.4 While for "constant dollar" expenditure series the quality problem enters via the price indexes used to deflate them, it is more direct and explicit for inputs that are measured in quantity or "physical" units. Labor, for example, is measured in number of workers or man-hours worked. In most measures used it does not matter whether the labor unit is composed of men, women, or children, of illiterates or college graduates, of native whites, Negroes or imported foreign workers. It is true that in one sense, a shift from or towards the use of child labor would reflect itself in labor "productivity." But it is still very interesting to distinguish between productivity increases due to a change in the labor force "mix" and those due to an increase in the productivity of a laborer of a given, narrowly specified, type or quality.

It is impossible here to enter into all the problems raised by "the changing quality of the human agent." One aspect of this problem is illustrated by the changing level of formal education in the agricultural

[3] For details of this analysis see Zvi Griliches, "Hedonic Price Indexes for Automobiles: An Econometric Analysis of Quality Change," Bu. of the Budget–NBER Price Statistics Review Committee, Staff Report No. 4, forthcoming.

labor force. My approach here is basically the same as before: find some indication of the relative market value of these qualities at a point or points in time and apply this information (or "weights") to the changing quality mix over time. This is more difficult for education than for some other qualities, since we have very little data that hold "other things

TABLE 2. QUALITY OF LABOR INPUT IN AGRICULTURE AS MEASURED BY CHANGES IN EDUCATION: THE RURAL-FARM POPULATION

School years completed	Males, 25 years and older					Females, 25 years and older				
	Education, rural-farm population, in—				Median income, 1950, total population[5]	Education, rural-farm population, in—				Median income 1950, total population[5]
	1940[1]	1950[2]	1957[3]	1959[4]		1940[1]	1950[2]	1957[3]	1959[4]	
	per cent				*dollars*	*per cent*				*dollars*
None	5.2	3.6	3.7	3.2	1,108	4.1	2.6	2.7	2.0	518
Grade school										
1–4	17.5	15.8	14.1	13.5	1,365	13.6	11.4	9.6	8.1	547
5–7	26.5[6]	23.9	20.7	19.3	2,035	25.8[6]	21.9	18.6	18.7	725
8	28.7[6]	26.9	26.0	25.2	2,533	27.4[6]	25.1	22.6	23.5	909
High school										
1–3	10.8	12.8	13.8	14.6	2,917	13.1	15.3	16.2	16.6	1,086
4	6.2	10.7	15.2	16.7	3,285	9.1	14.7	21.3	20.9	1,584
College										
1–3	2.5	3.1	3.7	3.5	3,522	4.4	5.6	5.6	5.9	1,660
4 or more	1.2	1.8	2.0	2.8	4,407	1.4	2.2	2.8	3.4	2,321
Not reported	1.4	1.8	.8	1.2	2,329	1.1	1.3	.6	.9	1,084
Quality measure[7]										
Dollars	2,250	2,379	2,452	2,500		934	1,020	1,085	1,102	
Index, 1940=100		106	109	111			109	116	118	

[1] *1940 Census of Population*, Vol. II, part 1.
[2] *1950 Census of Population*, Vol. II, part 1.
[3] U. S. Bu. Census, *Census Population Reports*, Ser. P-20, No. 77.
[4] U. S. Bu. Census, *Census Population Reports*, Ser. P-20, No. 99, Feb. 4, 1960.
[5] 1950 Census of Population, Vol. IV, Special Reports, *Education*, P-E, No. 5-B.
[6] 1940 breakdown was 5–6 and 7–8 years of grade school completed. 1950 data were available for 7 and 8 separately. The 1950 relationship of 7 and 8 in the 7–8 category was used to break down the 1940 7–8 category. Because of the upward trend in education, the adjustment overestimates the percentage completing 8 years of grade school in 1940, and hence it results in an underestimate of the index for 1950 and 1957.
[7] U. S. median income in 1950, by school years completed, weighted by the respective distribution of the rural-farm population by school years completed.
NOTE: The 1940 adjustment, the use of medians rather than means, and the restriction to 25 years or older, all contribute to an underestimate of the indexes for 1950, 1957, and 1959.

constant" adequately. In such a situation, we can get at best limits on the possible order of magnitude of this type of quality change using a variety of weights. The educational distribution of the rural farm population, 1950 U.S. income weights, and the resulting "quality" indexes are presented in Table 2. When the males and females are put together, these results indicate that the "quality" of the farm population has improved since 1940 by about 7 percent.[4] If we use 1958 income weights instead, for the 14-years-and-over population, we get an estimated 9 percent increase in quality using total population income weights, and a 12 percent increase if we use the rural farm median incomes by education in 1958

[4] The total increase is smaller than the separate quality increases for males and females, due to the rise of females from 11.4 to 18.6 percent of the farm labor force since 1940.

as weights.[5] One gets similar or slightly higher quality increases if one uses the educational distribution of farmers and farm managers and farm laborers and foremen instead of the rural-farm population. The only difference is a substantially higher increase in the quality of female farm laborers.[6] No matter how we weight it, there appears to have been a noticeable, albeit not very large, improvement in the quality of the farm labor force as a result of rising educational levels.

2.5 For some inputs the USDA has tried to take quality change into account. But even these measures could be improved upon. For example, given the tremendous increases in the average concentration (analysis) of fertilizers sold in this country, it would have made little sense to use tons of fertilizer as measure of fertilizer inputs. The USDA has used instead tons of "plant nutrients" as its input measure, counting the weight of the active ingredients rather than the total weight of fertilizers, and giving *equal* weight to the three most important plant nutrients: nitrogen, phosphoric acid, and potash. But even this approach may prove unsatisfactory in the long run. The three plant nutrients have somewhat different roles and are sold at different prices per plant nutrient unit. Since nitrogen is the most expensive nutrient and since there has been a trend towards relatively higher nitrogen consumption, even the plant nutrient measure will underestimate the "true" increase in fertilizer inputs. What is needed here is a "weighted" plant nutrient concept with the weights reflecting the relative prices of the different nutrients in some base period. Using 1955 implicit price weights (1.62 for N, .93 for P, and .45 for K) a weighted plant nutrient measure of fertilizer increases by about 6 percent more between 1940 and 1959 than the official USDA unweighted plant nutrient series.[7] Since the trend to nitrogen is only just now beginning to accelerate, this bias in the official measures is likely to become more serious in the future.

3. *Measuring the Services of Capital Equipment*

The common practice in productivity measures has been to measure changes in the services of capital equipment by changes in the *value* of the *stock* of capital in "constant" prices. The assumption was made (a) that the *flow of services* is proportional to the *stock* of capital equipment, and (b) that the relevant measure of stock for these purposes is the net (depreciated) *value* of equipment in "constant" prices. There is a variety

[5] These income weights are taken from Current Population Reports, Ser. P-60, No. 33, Jan. 15, 1960.

[6] The 1959 education data are taken from BLS, Special Labor Force Report No. 1, February 1960.

[7] These weights were derived from a 1955 cross-sectional analysis of prices of different fertilizer mixtures and their specifications. For details see Z. Griliches, "Distributed Lags, Disaggregation, and Regional Demand Functions for Fertilizer," *J. Farm Econ.*, Feb. 1959, pp. 91-92.

of reasons why such measures may not be good approximations to the relevant flow of services concept, but most of them can be summarized by pointing out that the value of the stock of capital at any point in time is the current valuation of current *and* all *future* services expected from this stock, whereas what we are interested in for estimating current productivity is only the value of *current* services from this stock. The two measures will diverge if the average age of equipment is changing, and that is happening all the time due to cycles in net investment, and if there are anticipations of future price changes or technological advances. In addition, the deflators used to convert current stock values into "constant" prices may not be right for performing the same task on the flow of services figures. In particular, they do not adjust for what is essentially a relative price change: the decline in value of older machinery due to technical obsolescence.

The relevant measure of capital services for productivity comparisons would be approximated, in a perfect market, by the rental price per machine hour times machine hours used. The rental price would be a "constant" price which would not only adjust for fluctuations in the general price level but also for price changes in the new and used machinery markets. It would change only if the physical flow of services were to deteriorate due to wear and tear (and age) or change its character of use due to the appearance of new and different machines.

The easiest and not unreasonable assumption to be made is that there is no deterioration with age, and that the service flow is constant over the life span of a machine. In this case, the conversion from stock to flow is relatively simple. Assume that all machinery has a fixed life of 15 years and that during its lifetime, the flow of services is the same each year. On its 15th birthday it just falls apart and has no scrap value. If such a machine is worth \$100 when new, and if the going rate of interest is 6 percent, then the annual flow of services during each of these 15 years must equal \$10.30 (a 15-year annuity of \$10.30 per year will have a present value of \$100 if the rate of interest is 6 percent). If the rate of interest is 10 percent, the annual flow of services from this \$100, 15-year machine equals \$13.15. Put another way, this is what the annual depreciation and interest charges will come to. Since under these assumptions the flow of services is constant, the sum of interest and depreciation is also constant, with the interest charges falling and the depreciation charges rising as the machine ages.

Given these assumptions, the service flow is a constant fraction of the *original* value of the machine throughout its life. Thus, a 15-year moving sum of past gross investment is then both the relevant "stock" or volume index for productivity purposes (though not for valuation) and the relevant figure that is to be converted at a constant rate into the flow of services concept.

That considerations of this type have a practical importance can be illustrated using USDA figures on gross expenditures on farm machinery, trucks, tractors, and 40 percent of automobiles and comparing our results wih USDA service flow estimates (Table 3).

The difference in the percentage change in the flows is not very great, but their absolute size is quite different. The absolute size of the flow of services under the "constant services" assumption (at 6 percent) is 14

TABLE 3. COMPARISON OF CONSTANT SERVICE FLOW ESTIMATES[a] AND USDA SERVICE FLOW ESTIMATES FOR FARM MACHINERY AND POWER[b]

Constant Service Flow Estimates

Year	15-Year sum of past gross investment	Annual flow of services at—			Index, 1940=100
		6%	10%	15%	
	billions of dollars, 1935-39 prices				
1940	7.26	.747	.954	1.241	
1958	16.91	1.741	2.223	2.891	233

USDA Service Flow Estimates

Year	Value of Stock	Interest charge at—			Depreciation	Depreciation plus interest at—			Index, 1940=100		
		6%	10%	15%		6%	10%	15%	Stock	Flow	
										6%	15%
	billions of dollars, 1935-39 prices										
1940	2.46	.148	.246	.369	.507	.655	.753	.876			
1958	6.20	.372	.620	.930	1.092	1.464	1.712	2.022	252	224	231

[a] Under "constant services" assumption—see text.
[b] Tractors, trucks, other farm machinery, and 40 per cent of automobiles on farms.

percent greater than the estimated 1940 flow based on USDA methods, and is 19 percent higher in 1958. If we assume higher rates of interest, as I think we should, the difference between the two methods gets even bigger. At 10 percent, "my" flow estimates are 27 percent higher in 1940 and 30 percent higher in 1958. At 15 percent, the estimates differ by about 42 percent in 1940 and 43 percent in 1958.

Perhaps the most serious result of the use of the wrong capital measure is the appearance of spurious cyclical movements in productivity. That these various measures may move quite differently over the investment cycle is illustrated in Chart 1, which plots the percentage changes in the official and the 15-year constant service estimates of capital on farms since 1950. While the official measure turns down in 1954, the service measure keeps rising through 1959.

The particular rate of interest chosen to "convert" stock into service

flows will affect strongly the final results. We know very little, however, about the rates at which entrepreneurs discount the future services of new capital items. What is relevant for our computations is this "internal" discount rate rather than some market rate of interest and whatever evidence we do have points to a relatively high rate. Expected "pay-off" periods in industry are quite short, and the marginal cost of capital is reasonably high. In agriculture, about half of the new farm machinery is bought on credit, and the rate of interest paid on this type of debt is at

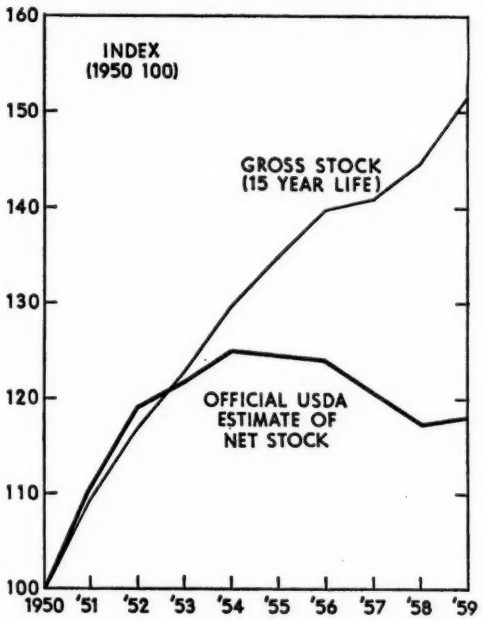


CHART 1. RECENT DEVELOPMENTS IN MACHINERY AND POWER ON FARMS: DIFFERENT MEASURES.[a]

[a] Tractors, trucks, other farm machinery, and 40 percent of farm automobiles.

least 10 percent. Since substantial price and technical uncertainty surrounds the future use of these machines and since at least some of the future obsolescence may be anticipated and "discounted," the average discount rate is probably substantially higher than 10 percent, perhaps around 15 percent.

Whatever little evidence we have on the "physical" productivity of capital in agriculture indicates also that it is (or was) quite high. Most production function studies in agriculture find that the marginal product of machinery is around 20 to 25 percent with 15 percent being close to the lower limit.[8] Similarly, studies of internal capital rationing indicate

[8] E.g., E. O. Heady and E. R. Swanson, *Resource Productivity in Iowa Farming*, Iowa Agr. Expt. Sta. Bul. No. 388, Ames, 1952, p. 756.

that the rate of return required to induce new investment is very high. One study found that of those interviewed farmers who would conceivably borrow more money for non-real-estate uses, 74 percent would not borrow more unless there was a high probability of a rate of return of 25 percent or higher.[9] The rate of return expected from internal funds perhaps would be lower, but it is unlikely to be very much so.

4. *The Value of the Stock of Machinery on Farms*

Having argued, in the previous section, that for productivity accounting we are interested in the value of the *services* of capital equipment rather than in the value of the *stock* of this equipment, we may still find it useful to examine the latter measure since it is a useful concept for many other purposes.

The value of the stock of equipment of a given kind on farms is estimated by the USDA by cumulating annual expenditures on the particular item, in constant prices, using a declining balance depreciation method. The estimated stock values depend then on three types of information: expenditure series in current prices, deflators, and the assumed method and rates of depreciation. Having discussed the deflators in a previous section, I would like to turn to the official depreciation method. Not much can be said about the other main input of data: the expenditure series in current prices. The methods used here seem to be the best possible, given budget and data limitations.[10]

The USDA describes as follows its depreciation assumptions and methods:

> Depreciation is the estimated outlay in current prices which would be required if farmers were to replace exactly the plant and equipment *used up*

[9] Heady and Swanson, *op. cit.*, p. 771.

[10] The 1955 Farmers' Expenditures Survey disclosed substantial errors in the official measures, particularly for items for which little direct information was available before this survey, such as trucks and automobiles. The survey results indicated that the AMS estimates of farmers' gross expenditures on the purchase of automobiles where too low by about 14 percent, that the AMS estimates of expenditures on trucks were too high by about 28 percent, that the estimates for tractors were too low by about 3 percent, and that expenditures on "other machinery" were underestimated by about 18 percent. Since the survey, the AMS has revised the truck and tractor expenditure series accordingly, but not the automobile or other farm machinery series. It is not clear why different categories of expenditures were treated differently in the revision process. The survey figures are from *1954 Census of Agriculture*, Vol. III, pt. 11. The unrevised AMS figures are taken from USDA, Agr. Hb. No. 118, Vol. 3, Table 8. The revised figures are from *The Farm Income Situation*, July 1959, Table 19. Note that the 1955 Survey figures in subsequent publications, e.g. Stat. Bul. 224 and Stat. Bul. 243, are not well adapted for our purposes since they subtract the values of a traded-in truck from the purchase cost of an automobile, if the truck was traded for an automobile. But if a substantial amount of trucks should be traded for autos, the cumulation of such "net" expenditure series would result in an underestimate of the stock of automobiles on farms and an overestimate of the stock of trucks on farms.

during the year. The derivation of the estimates is based on the declining balance method of depreciation, in which a constant percentage, representing the annual rate of consumption of each type of capital, is applied to the value of a capital item at the beginning of each year to obtain depreciation during the current year. The rates of depreciation assumed result in a total charge-off of approximately 95 percent of total value over the period of years estimated as the useful life of the capital item, the remaining 5 percent representing scrap value. The annual depreciation rates employed for *recent* years are: . . . automobiles, 22.0 percent; motor trucks, 21.0 percent; tractors, 18.5 percent; and other farm machinery and equipment, 14.0 percent.[11]

. . . This method (declining balance) assigns larger depreciation changes in the earlier than in the later years of the life of a piece of equipment. It is the most nearly consistent with the curve of declining *market* values of used equipment in the case of automobiles, trucks, tractors, and other farm machinery; . . .[12]

Ignoring the rather meaningless reference to the quantity of capital that is "used up" in production, the main question to be asked is, do the pattern and rates of depreciation used make sense? Since the USDA is interested in approximating the *market value* of the existing stock of capital,[13] using a constant percentage rate of depreciation is very much in accord with the few facts that we do have in this area. The evidence on the relative price of different age machines in the used machinery markets indicates clearly that the declining balance depreciation assumption approximates reality very well.

While the pattern of depreciation used by the USDA is the right one, the rates used seem to be too high for some of the items. The USDA has used the *pattern* of depreciation in the market place in deriving the pattern for its depreciation accounting but it has not followed this up to its logical conclusion by accepting also the market place evidence on *rates* to be used. Rather than using rates derived from used machinery prices, it has decided on rates by the arbitrary criterion that the resulting rate should depreciate the item to 5 percent of its original value by the time its "useful" (average) life is up.[14] While for some items such as automobiles and trucks the resulting rates of depreciation appear to be close enough to observed market rates, for other farm machinery and, in particular, tractors, the rates used by the USDA are much too high.

The used machinery market evidence on depreciation comes from annual tractor and other farm machinery trade-in guides ("blue books") and auction prices published in *Implement and Tractor*. Based on avail-

[11] USDA, Agr. Hb., No. 118, Vol. 3, p. 17. Emphasis supplied.

[12] USDA, *The Farm Income Situation*, Oct. 1955, p. 32. Emphasis supplied.

[13] While this may not be too clear from the above quotations, the resulting stock estimates are used in *The Balance Sheet of Agriculture*, where the desired concept is clearly market value.

[14] Besides being arbitrary, this approach suffers from the problem that as far as *social* accounting is concerned it is wrong to depreciate everything over the average life of the item. At the end of the average life span of an item, one half of the original population is still alive.

able "blue book" data,[15] except for the first year, the calculated depreciation rates are substantially below the USDA rates. The data point to a declining balance depreciation model, with a somewhat higher rate in the 1930's than in the 1950's. Over the whole period the depreciation rate computed from the relative price of different age tractors (leaving the first year out) was around 11 percent.[16] This seems to be also the average rate of depreciation in the market value of other farm machinery in recent years. Adding another percentage point for the "pure accident rate," the computed market rates of depreciation are still only around 12 percent and are substantially lower than the 18.5 (and higher) tractor rate and the 14 percent rate used on other farm machinery by the USDA.[17]

While the rates of depreciation used currently by the USDA may appear to be too high, the rates used in the past were even higher. In the twenties, the USDA depreciated farm automobiles and trucks at about 35 percent per annum and tractors at about 25 percent per annum. In the thirties the auto and truck depreciation rate was around 25 percent and the tractor rate around 24. The use of too high depreciation rates currently and even higher ones in the past leads to a substantial underestimate of the value of the stock of machinery on farms. Table 4 shows the magnitude of this underestimate for various items as of January 1957.

Another, independent way of checking the USDA estimates of the value of capital on farms has become possible as the result of the 1956 National Farm Machinery Survey which provides detailed estimates of the number of different machines on farms and their age distribution. One can price each of these machines as of the beginning of 1957 at the average new price for each item, and then, applying estimated depreciation rates from used machinery market data to the survey age distribu-

---

[15] Auction-price data are difficult to summarize because of the very large variance in reported prices. On the whole, however, the implied depreciation rates in auction prices are very close to the "blue book" data with the possible exception of somewhat lower depreciation of old (ten years and older) tractors.

Copies of tables summarizing some of the "blue book" evidence on depreciation for tractors and other farm machinery are available from the author on request.

[16] The estimated first year depreciation rate is unreliable and may not be relevant. The denominator is the "list price," which very few people pay, and last year's model is usually more than one year old (probable median age around fifteen to sixteen months). Also, part of the first year's large drop in value is simply due to the "loss of virginity," the passage of the item from the "new" to the "used" category, which may be irrelevant for our calculations.

[17] The used machinery market provides us with information on the decline in value of a *surviving* machine with age. But not all machines survive to the same age. The additional percentage point is intended to take care of the disappearance of some machines during the early part of their life. Actually, as far as declining balance accounting is concerned, this omission does not matter too much. By the time machines begin to die off in serious numbers, i.e., around age 15 or 20, even at the relatively low 12 percent rate of depreciation there is little left of the original value of the machine (about 15 percent).

tions, derive the average net (depreciated) value of each item on farms.[18] The resulting estimates are summarized with comparisons in Table 4. They are about 36 per cent higher than the comparable USDA estimates. The largest underestimate is for tractors, about 75 percent, but even "other farm machinery" is underestimated by about 20 percent. Most of the difference, however, comes from the use of a different depreciation rate rather than from differences in coverage and pricing. The difference is very much smaller when the USDA data is recomputed using lower depreciation rates.

TABLE 4. DIFFERENT ESTIMATES OF THE VALUE OF THE STOCK OF TRACTORS AND OTHER FARM MACHINERY ON FARMS AS OF JANUARY 1, 1957

Basis of estimate	Tractors	Other farm machinery
	million dollars	
USDA[a]	3,319	7,636
Constant 12 per cent declining balance depreciation rate[b]	4,609	8,721
1957 stock priced[c]	5,814	9,133
ditto[d]	6,307	
ditto[e]	4,448	

[a] From USDA, *The Balance Sheet of Agriculture, 1959*, Table 11.

[b] Computed from unpublished USDA data, using the same data and methods as the USDA except for holding the depreciation rate constant at 12 per cent. The USDA estimated 1920 values of stock were used to initiate the cumulation process.

[c] From NBER worksheets. Detailed tables to be published.

[d] The same as [c], but using the average price paid by farmers for new tractors in 1955 inflated to 1957 by the USDA price index of prices paid by farmers for tractors. The resulting average "new" tractor price is about 8.5 per cent higher than the price used in [c].

[e] The number of tractors on farms multiplied by the average price paid in 1955 by farmers for a *used* tractor, inflated to 1957. The assumption made here is that tractors traded on the used market represent a random sample of all tractors on farms. The 1955 price for this and the previous footnote computation is taken from USDA, Stat. Bul. 243, Table 72.

Looking at it in different ways, it seems quite clear to me that the existing USDA figures seriously underestimate the current value of the stock of machinery on farms. Since the used machinery price data, while poor, are better than no data, and are reasonably easily accessible, I see no reason why the USDA could not improve its estimates in this area by using this type of information in determining its depreciation rates.

5. *Input Series Based on Implicit Productivity Assumptions*

Besides the general paucity of information on a variety of items, one of the major difficulties with many input series in agriculture is the under-

[18] While the depreciation rates used varied from item to item and from age to age, this variance was small, and one can describe the method used, approximately, as applying an 11 percent rate of depreciation to the 1957 stock and age distribution of machinery valued at (mostly) average 1955 prices paid for new items inflated to 1957. The detailed tables underlying this estimate will be published in the forthcoming complete report.

lying lack of annual data and the unsatisfactory nature of the resulting compromises. For many inputs in agriculture the series are constructed as follows: Given a benchmark for the item in a particular year and its average use per unit of output or per unit of some other input for which more information is available, the benchmark values are extrapolated by the proxy series (output or other input) with which this input series is assumed to move in the same proportion. The most important example of such a series is the ARS estimate of manhours "used" in agriculture.[19] It is true that they are based on a very detailed set of productivity assumptions, e.g. on the estimated manhours required for harvesting a bale of cotton under different harvesting methods and information on the changing relative importance of the different harvesting methods; still they are essentially analytical constructs with many built-in productivity assumptions, and provide no independent information (since the "benchmarks" are also constructs) on actual manhours used in agriculture. Similarly, many expenditure series in agriculture such as building, automobile, and truck repair expenditures, and expenditures on veterinary medicine and on dairy supplies are estimated by extrapolating a benchmark by the number of automobiles, cows or milk production, and appropriate price indexes.

While these may be the best possible methods of estimating expenditure series and perfectly adequate for many purposes, they are less satisfactory if one is interested in productivity changes, and quite unsatisfactory if one is going to use these data for *annual* productivity comparisons. A series based on such "constructed" input series or deflated expenditure data consists of nothing more (between benchmark years) than the proxy series (usually output) and the implicit productivity assumption about the relation of the particular input to output or other proxy series. Thus, in the short run, such a series provides no independent information about movements in productivity. An output per unit of such an input series would be either constant between benchmark years or reproduce the productivity assumptions built into the input series by their estimators.

Besides producing irrelevant or "assumed" annual movements in the input series, such estimating procedures may also lead to biased estimates in the level of various inputs used unless the "benchmarks" are revised often. Unfortunately, for many items the benchmarks are far apart, and the possible cumulative bias over time is quite serious. The 1955 Farmers' Expenditure Survey disclosed a 10 percent underestimate in the official USDA production expenditure series (excluding depreciation). This underestimate was substantially larger for items for which little direct data are available and various indirect extrapolation techniques are used.

[19] These series were called originally, and much more accurately, "required" manhours rather than manhours "used."

Seed purchases, for example, were underestimated by 42 percent, and repair and operation of capital items by 26 percent.[20] Similarly, the ARS manhours series were revised downward recently by 17.5 percent.[21]

6. *Conclusions*

In a brief survey of this kind it is impossible to be comprehensive and point out the data gaps and special problems of all the agricultural inputs. For example, nothing has been said here, and very little is known, about the changing quality of land and the apparently large investments that have been and are being made in "farm structures other than buildings."[22] It is clear, however, from the evidence presented above, that some of our input series could be subject to definition and measurement errors of substantial magnitude. Since our "productivity" measures are residual measures, an error in some of the input series would result in a relatively much larger error in the productivity measures.

The possible empirical importance of some of the issues raised in this paper is illustrated in Table 5. It presents the official input and productivity estimates for 1940-58, 1947-49 input weights, and the adjustments that are implied by *some* of our findings above. Four adjustments are made: (1) the machinery and power input index is given a 30 percent higher weight and the other weights are recomputed accordingly. This adjustment is based on our finding that the official capital series underestimate the absolute magnitude of capital services in agriculture (even if they are measured by value of stock) by about 30 percent, and the 26 percent underestimate of repairs and operation of capital equipment disclosed by the 1955 survey. (2) The machinery and power input index, since it is based on deflated expenditures, is assumed to be biased downward by 7 percent since 1947-49, and again by the same amount between 1940 and 1947-49. This is based on the estimated upward bias in the Prices Paid index since 1947-49 (see Table 1) and on the assumption that a similar amount of bias accumulated during the previous 1940-1947-49 period. It does not allow for the type of quality changes that are not caught by indexes such as the WPI or CPI, discussed in Section 2.3. (3) The index of labor input is increased by about 8 percent to reflect the increasing level of education of the farm labor force. (4) The fertilizer and lime index is increased by 6 percent to reflect improvements in quality not caught by the unweighted plant nutrient measure. The same 6 percent increase is applied to the "other inputs" category on the as-

[20] USDA Stat. Bul. No. 224, *Farmers' Expenditures in 1955 by Regions*, Washington, 1958, p. 3.

[21] Without announcement or explanation.

[22] In 1955, farmers' expenditures on "other farm improvements" amounted to $544 million. At the same time expenditures on farm building construction came only to $390 million. But the existing series include only the latter figure. These figures are from *1954 Census of Agriculture*, Vol. III, pt. 11, Table 4.

TABLE 5. U.S. AGRICULTURE: CHANGES IN INPUT AND PRODUCTIVITY, 1940–1958

Category	Weight 1947–49[a]	Indexes, 1947–49 = 100				Adjusted weight[d]
		USDA[b]		Adjusted[c]		
		1940	1958	1940	1958	
Labor	.45	122	66	117	69	.43
Real estate	.14	98	105	98	105	.13
Power and machinery	.16	58	137	54	147	.20
Feed, seed, and livestock	.09	63	141	63	141	.09
Fertilizer and lime	.03	48	166	47	171	.03
Other	.13	93	127	90	131	.12
Total Input		97	100	92	106	
Output		82	125	82	125	
Productivity[e]		85	124	89	118	
1940 = 100			147		133	

[a] From R. A. Loomis, "Production Inputs of U.S. Agriculture," *The Farm Cost Situation*, May 1960, p. 32.

[b] 1960 Economic Report of the President, Tables D-67, 68, 69.

[c] 1940 labor index divided by 1.04, machinery and power index divided by 1.07, and fertilizer and lime and "other input" indexes divided by 1.03. For 1958, these indexes were *multiplied* by these same numbers. Total input index computed using "adjusted" weights.

[d] Computed by multiplying the weight of power and machinery by 1.3 and dividing all the weights by 1.048 to make them add up to 1.00.

[e] Computed from unrounded data used in this table. Will differ slightly from the official indexes due to rounding errors and the more detailed breakdown of inputs used in computing them.

sumption that quality improvements in this category have been *at least* of the same order of magnitude as those not caught by an already quality oriented input measure of fertilizer. Since most of the series in this category are measured with very little regard for quality changes and are deflated by Prices Paid indexes that explicitly include quality changes, the 6 percent figure is very much an underestimate of the possible importance of quality change in this category. The last two adjustments are distributed equally between the pre- and the post-1947-49 periods. Taken together, these few adjustments "eliminate" (or account for) about 30 percent of the apparent increase in agricultural productivity since 1940.[23] This figure and the paper as a whole is not intended to measure the importance of total input quality change in agriculture. Rather, it should be taken as an indication that quality change *may* be important and that attempts to measure its importance are feasible and should be encouraged.

[23] This percentage would have been very much higher if we had stopped our calculations as of 1957 rather than 1958. From 1957 to 1958 the output index went up by about 10 per cent while the input index increased by only 1 per cent. A little less than one-half of the difference between the two productivity indexes is due to giving a higher weight to the machinery and power index. The rest is the result of the other "quality" adjustments.

The divergent trends in the use of different inputs in agriculture result in a very great sensitivity of productivity measures to changes in the relative weight of different inputs.[24] It is impossible for me, given the time limitations, to discuss the problem of the "optimal" choice of weights here, but I would like to draw your attention, in closing, to a very important and difficult problem in that area. If one accepts the view that U.S. agriculture has been in a chronic disequilibrium state most of the time, and that the marginal product of labor in agriculture has been below the going wage rate (on the average) and the marginal product of capital has been above its going price (due to capital rationing, among other things), it may be wrong to use "price" weights in aggregating our input indexes. What we need here are production function weights or coefficients, and price weights may provide a very poor approximation in a disequilibrium world.

[24] See also R. A. Loomis, "Effect of Weight Period Selection on Measurement of Agricultural Production Inputs," *Agricultural Economics Research*, October 1957, 129-135.

DISCUSSION: MEASURING INPUT CHANGES IN AGRICULTURE

ROBERT H. MASUCCI
Agricultural Marketing Service, USDA

Since our science, Economics, is primarily concerned with the study of human behavior as a relationship between scarce means with alternative uses and multiple ends, it was only a question of time before an aggregative measure of means applied in agriculture was developed to be used in analyses of relationships to total farm output.

The development of a farm input index was inevitable in view of the existence of a farm output index, since for many purposes it is not enough for the economic analyst to be able to measure changes in output over time. He will quite frequently wish to measure changes in the quantities and composition of the inputs that have accompanied such changes in output as, for example, in problems relating to relative efficiencies in resource use. I believe the new USDA input index will serve quite usefully in this respect and I welcome the addition of this aggregative input measurement to the other measurements of agricultural inputs that have been widely used in the past.[1]

With respect to Griliches' paper, he seems to have studied the subject matter of inputs into agriculture quite exhaustively. The paper is an

[1] See, for example, John W. Kendrick, "Productivity Trends in Agriculture and Industry," *J. Farm Econ.*, 40:1554, Dec. 1958.

excellent one and I am sure the full study from which it is taken will be also. The points he raises with respect to (1) quality change adjustments in measuring price changes and labor inputs and; (2) the relevant measure of capital stock and service flows are convincingly made. However, although the various adjustments he suggests have merit and, I am sure, will be given very careful consideration in subsequent revisions of the index, the magnitudes of the adjustments he has presented for illustrative purposes appear to be on the high side. As a matter of fact, he himself has stated that since his paper is a preliminary report on a study to be published in full at a later date, "some of the conclusions may appear extreme, because they are stated without the detailed explanation and qualification that will be possible in the full report. . . ."

Incorporating some of his adjustments into the USDA index, Griliches has estimated an increase in productivity of 33 percent from 1940 to 1958, compared with 47 percent indicated by the USDA measures of output and input. Thus it appears that the USDA measures overstate the rise in productivity over the period by some 14 percent. Personally, I don't believe it to be quite that high, even accepting most of his adjustments in concept. I think he has tended to overadjust with his alternative measures. Moreover, adjustments for quality changes in output, if possible, would probably tend to compensate for some of the adjustments for quality changes in inputs. Making allowances for both of these factors I would place the overstatement at about 5 percent. An "error" of this magnitude may or may not be considered "substantial" for most purposes. Fortunately, for most policy and program decisions I do not believe the margin is crucial. I am not suggesting that the overstatement is to be ignored nor am I suggesting that the implications of errors in the levels of individual inputs, which affect the relative composition of the total complex, are trivial. The latter are certainly important in studies of relative efficiencies of individual resources used in agriculture. I firmly believe it is incumbent upon us as technicians to constantly seek to refine our concepts and measures so that they may be of maximum usefulness to analysts, administrators, and policy makers in agriculture. I merely wish to point out that for most purposes the present index is reasonably accurate, despite the limitations covered by Griliches.

That the new index will be under constant scrutiny by specialists seeking to improve and refine it I have no doubt. This has been the history of many of our present aggregative measures, such as the national income and product accounts, the index of industrial production, and the various price indexes, to name only a few. As a matter of fact, we are performing the function of evaluation right here at this session. And Griliches' paper is an excellent example of some of the refinements and revisions that are likely to be considered in subsequent revisions of the

index. As a result of this process of scrutiny and refinement, I am sure the index will develop into as useful, as widely accepted, and as accurate a measure as some of those I have just referred to. Nevertheless, imperfection will be ever present because most measures in our science are merely imperfect conventional yardsticks designed to give us only reasonably accurate answers to the problems that confront us.

At this point, I should like to turn to the consideration of what the new index measures and how it compares with another widely used measure of input. Conceptually, it is a measure of total resources applied to agriculture, including intermediate product inputs of the nonfarm sector as well as farm factor inputs. In concept then, it is parallel with the output index since the latter measures production in a gross sense rather than in a value added sense. This means that total productivity measures derived by dividing the output index by the input index are "composite" measures, reflecting not only changes in factor efficiency but also changes in output resulting from changes in the application of intermediate inputs. For many purposes, the composite measure is the most suitable one. For example, analyses of total factor productivity in agriculture using real gross product or value added estimates will show changes in real value added per composite unit of factors applied, but they will not reveal the joint effect upon the total output of both changes in factor inputs and intermediate product inputs. For the latter purpose one would use the composite measures of output and input. For many purposes it would be useful to know not only total factor efficiency as it relates to real value added, but also the extent to which such efficiency accompanied, and in large part, was dependent upon changes in the various intermediate products applied. I'm suggesting here that even the so-called total factor productivity ratios, so ably developed by Kendrick, must be supplemented by analyses of total productivity ratios for a more complete insight into the changes over time in means applied in agriculture relative to ends achieved.

Finally, I should like to turn to the question of measurements of price change. Inasmuch as Grilliches' paper mentions the Parity Index prepared by the Agricultural Marketing Service rather critically, I offered the opportunity to read the paper to Mr. B. Ralph Stauber of the AMS, who is in large measure responsible for the current preparation of the Index. He has asked that I pass on the following brief comments, which I am glad to do.

Of course, the Parity Index is not the primary interest of this paper, but since it has been mentioned it may be worth noting that there are few subjects more controversial than how quality change should be handled in a price index. This matter of specifications is an old argument about a complex subject. It cannot be solved in the time available here. It merits a full scale discussion in its own right.

Unfortunately, Mr. Griliches overstates the Department's position in the matter, for in fact a good deal of attention has been and continues to be given to the specification problem. Specifications have been frequently tightened and none broadened.

It should be mentioned also that the Index of Prices Paid, including Interest, Taxes, and Farm Wage Rates was not designed specifically for the purpose of input-output analysis. It was designed as an index of prices of commodities and services farmers buy. It is a measure of the *price component* of farm expenditures, in the same sense that the Index of Prices Received by Farmers is an index of the *price component* of receipts from sale of farm products.

Finally, the Budget Bureau has contracted with the National Bureau of Economic Research for a committee to review the whole field of price indexes. Dr. George Stigler of the University of Chicago is Chairman of the Committee, and our staff has been working closely with the Committee.

DISCUSSION: MEASURING INPUT CHANGES IN AGRICULTURE

B. D. GARDNER
Brigham Young University

These two papers should be considered as complements rather than as substitutes for most of the varied purposes which they serve. The Griliches paper is largely a critique of methods and procedures reported in the other as they apply to estimation of aggregate inputs for agriculture for the purpose of explaining output changes. Even if Griliches is right in his criticisms it does not mean that the attempt of the USDA to construct this new input index is not useful for other purposes.

The new index helps confirm what agricultural economists have suspected for some time. When used with the output index, the input index permits calculation of an aggregate output-input ratio. The rapidly increasing nature of this ratio indicates at least that output increases cannot be explained by increases in inputs as they have been conventionally measured. This realization has led many (including Barton and Durost) to conclude that agriculture has been beset by a "technological revolution." Yet, Barton and Durost are correct in pointing out that other things may be at work here as well—increased specialization in agriculture, adjustments toward a more optimum combination of resources, variations in weather, etc.

However, I would like my name added to the list of those who believe that these broad characterizations are almost wholly meaningless in substantive terms in accounting for productivity increases in agriculture. For this task, much more needs to be explained.

The argument that aggregate inputs (as they are traditionally measured and counted) have remained substantially constant in the face of greatly

increased output, implies that the increased production has come out of a sort of input "vacuum." This is folly: of course there have been input increases, if an input is anything that generates product. However, since we haven't been able to identify these inputs with existing methods we lump them together and call it "technological change." The stage is set for Dr. Griliches' path-breaking work.

I interpret Griliches' primary hypothesis to be: A large proportion of increasing outputs can be attributed to qualitative and perhaps quantitative (if inputs are appropriately measured) increases in inputs. Despite the conclusions of the Barton-Durost paper, it seems to me that the evidence Griliches presents suggests that his hypothesis should be taken seriously.

I would now like to raise a few questions about some "specifics" in each of the papers. First, let me say that since the Griliches paper is, in some ways, a discussion and critique of the USDA procedures, I will not repeat his criticisms although I am in substantial agreement with most of them.

In the new USDA index, operator and family labor are given the same value per unit as is hired labor. Especially since management is not elsewhere counted, operator labor would seem to be more productive than hired labor, *a priori*. Barton and Durost give evidence for this when they point out that "the total residual returns to nonpurchased inputs of labor, land, and capital exceeded the calculated total returns to these factors based on market prices paid for similar inputs purchased." The higher residual returns in the case of labor may mean that counting man-hours (as if all labor were homogeneous) understates the "true" quantity of labor input. This becomes more serious over time as the quality of the human agent increases, particularly if operator-family labor makes more progress in this regard than does hired labor. And it seems to me that in fact such might well be the case with our educational and extension services in agriculture tied closely to the management function, and thus more to operator than to hired labor. If I am right the downward bias of the man-hours procedure increases as time passes. Over time the labor input may not have declined as rapidly as the man-hour calculation implies.

Barton and Durost state: "The important capital inputs associated with public investments in research, education, health, transportation, and so on, are excluded from the input measure. Inputs from private investments of this kind are covered to the extent that they are reflected in the input prices used as weights." But if there are more of these private investments in operator than in hired labor, relatively, then they will not be entirely reflected in price, in the case of operator-family labor, because it is assumed to have the same value as hired labor.

Another procedure that is questionable is the one where grazing fees are assumed to represent the value of inputs of grazing land not in farms but included in farm operations. It is generally accepted that the government fees are below the value of the marginal product of the grazing inputs. The seemingly obvious alternative to the USDA procedure would be to evaluate values of marginal product for public grazing inputs and use these as the weights. This procedure also is invalid for the reason that much of the differential between the grazing fee and the value of the marginal product gets capitalized into private ranches to which the grazing permits are tied by the allocating procedures of the Forest Service and the Bureau of Land Management. Therefore, if you use the value of marginal product to evaluate public grazing you overstate value of total resources (public and private). The USDA procedure would be the correct one if all the differential between value of marginal product and grazing fee were capitalized into ranch values. However, some of my own recent work[1] suggests that only a fraction of the differential is capitalized because of the rigid way permits are attached to certain ranches (ranchers), and also because of the uncertainty of future grazing privileges. This means the USDA procedure understates the total value of public and private grazing resources and therefore understates farm real estate. Of course, the extent of the "understatement" is an empirical question that relates in turn to two questions: (1) the proportion of the differential (value of marginal product minus government fee) that does get capitalized and (2) the importance of public grazing in the total real estate of agriculture. My own impression is that in the case of Forest grazing most of the differential is capitalized while in the case of Taylor grazing it is not. In any case, Western public grazing is probably a very small part of the total agriculture and therefore the aggregate input index may not be much affected as a result of re-valuing the real-estate inputs of public land.

The attempt of Griliches to account for some of the qualitative changes in inputs is laudable. This is an important breakthrough and his insights should help to clear the way for meaningful future work. However, I wish to raise a question or two about some of his relationships.

Griliches believes that labor inputs should be increased by eight percent to reflect the increasing level of education of the farm labor force. This assertion requires a rather heroic assumption—that if the educational level rises by eight percent, the productivity of labor rises by eight percent. I doubt that there is a one-to-one relationship. Moreover, it could

[1] Gardner, B. D. "The Pricing of Livestock Forage on Federal Range Lands," *Economic Research in the Use and Development of Range Resources*, Conference Recordings, Committee on Economics of Range Use, WAERC, Logan, Utah, 1959.

well be that productivity increases would be proportionally greater than education increases.

Similarly, in accounting for quality changes in machinery, Griliches' work is interesting but still rough. The procedure, to "Derive implicit specification prices from cross-sectional data on the price of various 'models' of the particular item and use these in pricing the time series specification change in the chosen (average or representative) item," is a step forward. Yet this process may still miss most of the qualitative change in an item of machinery that makes it more productive. Griliches can capture some of the increased productivity attributable to differences in horsepower, weight, various attachments, etc. These items themselves can be viewed as "intermediate inputs" that also change over time. For example, one horsepower produced currently on a large diesel engine may be quite a different "animal" in terms of capability of generating output per unit of "cost" than one horsepower on a small gasoline engine thirty-five years ago. It is also obvious that "attachments" have changed markedly over time. The current item from which the prices are derived is (in most cases) vastly superior to its counterpart in an earlier period. This means that there will be even more differences in quality between machines in different time periods than Griliches' data show.

I agree with Griliches' two main criticisms of the USDA procedures to measure the services of capital equipment, (1) the depreciated value of the capital stock is inappropriate for measuring physical capital inputs and (2) the rate of discount chosen to convert stock into service flows is much too low. Griliches argues that the relevant rate is an "internal" (to the farm) discount rate and what evidence there is points to a high rate. In studying costs and benefits of private range reseeding in the West I found the "internal" rate to be about 17 percent, which is consistent with other evidence to which he refers.

In conclusion, an aggregate index of inputs is indispensible in fully understanding agriculture as an industry. The USDA has provided it for us, and it should be most useful. However, in explaining the source of increasing output over time the aggregate input index has major limitations. Griliches has presented some illuminating ideas that will help to improve the index for this purpose.

EXISTING PROGRAMS FOR DATA PROCESSING ON ELECTRONIC COMPUTERS

CHAIRMAN: GEORGE G. JUDGE, UNIVERSITY OF ILLINOIS

ANALYSIS OF VARIANCE AND COVARIANCE

ARNOLD GRANDAGE
North Carolina State College

AS RECENTLY as five years ago programs to perform Analysis of Variance and Covariance were almost nonexistent. Electronic computers had been used primarily in mathematical, engineering and accounting applications. The necessity for repeated reordering of data on the basis of multi-level identification made the use of conventional sorting and tabulating equipment of paramount importance in processing data for the analysis of variance. Improved algorithms for internal sorting plus the high speed and errorless operation of electronic computers have made their use in these problems feasible if sometimes uneconomical.

Before considering available analysis of variance programs, a discussion of programming methods and future sources of information is in order. Three approaches to programming the analysis of variance may be used: conventional methods, as presented by Bennett and Franklin, Hartley, Cochran and Cox, and Snedecor (1, 2, 4, 7);* matrix methods, as presented by S. N. Roy (6); iterative methods, Corsten and Patterson (3, 5). The conventional methods have been used most often and have the advantage of being widely understood and generally efficient. Matrix methods are restricted in application since they generally require large storage capacities, but have the advantage that if matrix or multiple regression routines exist analysis may be performed without further programming. The method may be adapted easily to unusual designs. The iterative methods may be most useful for unbalanced data.

Any computer installation anticipating extensive analysis of variance computations will be fortunate indeed if it can find programs efficient enough for its use. The occasional user of these techniques will find general programs that will solve his problems, albeit awkward and inefficient. These analyses may take so many forms as to input, design and output requirements that specialized programs and systems are often required to meet the needs of the user. Three types of programs will serve

* Numbers in parentheses refer to references appended to this paper.

as a basis for most analyses: a program for nested or hierarchal designs, a program for factorial experiments and a program for pooling the results of the above. Such a set of programs may be combined into one general system and by proper manipulation can yield results for the most complex designs. A line-at-a-time program can be very efficient and flexible, particularly with card input, where sorting can be done more efficiently on conventional equipment. It is hoped that in the future a statistical interpretive system will be available to make programming of special analyses of variance routine. Most of the general analysis of variance programs require the services of a statistician in order to adapt them to specific problems.

The following list of programs is necessarily incomplete. It is drawn almost entirely from university sources, the availability of industrial programs being limited. Most of the programs are for the IBM 650, because of the author's association with this machine and because very few analysis of variance programs exist for other machines. Programs have been listed when only the titles are known since it is felt that knowledge of their existence is of importance. Detailed information regarding the programs may be obtained from the originators, or in some cases, from the machine manufacturers.

There are several sources of information regarding statistical programs. First, of course, are listings prepared by the machine manufacturers. The Institute of Mathematical Statistics has a project under the direction of F. C. Leone of Case Institute of Technology whose purpose is to prepare and publish an annotated bibliography of statistical programs. Dr. Leone will be glad to receive contributions to this bibliography. It is hoped that this list will be kept up to date by publication of program abstracts in various statistical journals (*Technometrics, Biometrics, etc.*). Lists of programs have appeared in the *Communications of the Association for Computing Machinery* as well as in certain subject matter journals (Psychology, Chemistry, etc.).

Programs

University of Arizona, Tucson, Arizona

650

1. Analysis of Variance, One-way classification, Randomized Block, Latin Squares, Split plot, Split-split plot. One variable.

North Carolina State College, Raleigh, North Carolina

650

1. General Analysis of Variance and Covariance. 19 variables, 20 classifications.
2. Analysis of variance and covariance for Nested Designs. 33 variables, 8 classifications.

3. ANOVA for Randomized Blocks, Split plots, Split-split plots, Split-split-split plots and five factor Factorials. 1 variable.
4. ANOVA for Lattice Designs. 1 variable.
5. ANOVA for Randomized Blocks. 1 variable.

State College of Washington, Pullman, Washington
650
1. General ANOVA. 99 variables, Line-at-a-time.
2. ANOVA or covariance and adjusted means program. 6 variables.
3. Analysis of Covariance. One independent, 5 dependent variables.

Battelle Memorial Institute, Columbus, Ohio
650
1. ANOVA. 2 variables.

Case Institute of Technology, Cleveland, Ohio
650
1. ANOVA. 3 variables.
2. Statistical Interpretive System.

Ohio State University, Columbus, Ohio
650
1. Three-way ANOVA.
2. Four-way ANOVA.

Oklahoma State University, Stillwater, Oklahoma
650
1. ANOVA, Hierarchal Classification of 4 stages.
2. ANOVA by Doolittle procedure.

Brown University, Providence, R.I.
650
1. Analysis of Non-Replicated or Fractionally replicated factorial designs.

University of Iowa, Iowa City, Iowa
650
1. Design (for Linquist's Analysis of Experiments). 1 variable. A set of eight programs.

Iowa State College, Ames, Iowa
650
1. Nested ANOVA. (No details known.)
2. General System.

Virginia Polytechnic Institute, Blacksburg, Virginia
650
1. Nested ANOVA. 2 variables.
Simple univariate analysis. 9 variables.

Cornell University, Ithaca, New York
650
1. ANOVA, means, etc., for equal sub-classes.
2. Equal numbers Analysis of Variance.

3. Balanced ANOVA, one pass per class.
4. Weighted squares of means analysis for one classification.
5. Unequal Subclass Numbers Analysis.
6. Balanced 2-way ANOVA. 6 variables.
7. ANOVA, multiple classifications, equal numbers.
8. Fitting constants in a 2-way classification.
9. 2- way nested classification, one covariable.
10. 2-way classification, variance components.
11. 2-way nested classification, variance, covariance components.

Data Processing Unit, Department of Agriculture, Ottawa, Canada
650
1. 4 × 4 confounded factorial.
2. Randomized block analysis.

Bettis Atomic Power Division, Westinghouse Electric Corporation, Pittsburgh, Pa.
650
1. Yates Analysis of Mixed Factorial Experiments.

IBM, New York, New York
650
1. ANOVA. 6.0.004. Seven factor factorial.

University of North Carolina, Chapel Hill, North Carolina
Univac 1105
1. ANOVA, matrix method. Covariables.

University of California, Los Angeles, California
709
1. ANOVA BIMED No. 11. 8 variables factorial.
2. ANOVA BIMED No. 12. 14 variables factorial.
3. Covariance BIMED No. 13. 2 to 6 variables, 8 covariables.
4. General Linear Hypothesis for ANOVA models. BIMED No. 14. Matrix Method.

Remington Rand, New York, New York
Univac I
1. Factorial Design. 6 way.
2. Standard Regression Routine (Analysis of Variance).

General Electric Corp., Louisville 1, Kentucky
Univac I
Univac II
1. Multiple Linear Regression with ANOVA.

Ramo-Wooldridge Corporation, Los Angeles, California
704
1. General ANOVA. One variable, fractional factorial.
2. Latin Squares ANOVA. one variable.

REFERENCES

(1) Bennett, C. A., and Franklin, N. L., *Statistical Analysis in Chemistry and the Chemical Industry*. New York, John Wiley and Sons, 1954.
(2) Cochran, W. G., and Cox, G. M., *Experimental Designs*. New York, John Wiley and Sons, 1950.
(3) Corsten, L. C. A., "Vectors, A Tool in Statistical Regression Theory," *Mededelingen van de Landbouwhogeschool*, 58 (1), 1958.
(4) Hartley, H. O., "Programming Analysis of Variance for General Purpose Computers," *Biometrics* 12 (2), 1956.
(5) Patterson, R. E., "The Use of Adjusting Factors in the Analysis of Data with Disproportionate Subclass Numbers," *J. Amer. Stat. Assoc.*, 41 (235), 1946.
(6) Roy, S. N., *Some Aspects of Multivariate Analysis*. New York, John Wiley and Sons, 1957.
(7) Snedecor, G. W., *Statistical Methods*. Ames,Iowa, Iowa State College Press, 1946.

LINEAR PROGRAMMING ON HIGH SPEED COMPUTERS

RUDOLF J. FREUND
Virginia Polytechnic Institute

1. *Introduction*

The general linear programming problem can be stated: to maximize (or minimize) the linear function

$$z = \underline{c}'\underline{x} = \sum^{n} c_j x_j$$

subject to the linear restriction

$$P\underline{x} = \underline{b},$$

or
$$\sum p_{ij}x_j = b_i, \qquad i = 1, 2, \cdots, m,$$

and
$$\underline{x} \geq 0,$$

or
$$x_j \geq 0, \qquad j = 1, 2, \cdots, n.$$

The problem can easily be adapted to handle inequality restrictions of the form

$$\sum p_{ij}x_j \leq b_i$$

or

$$\sum p_{ij}x_j \geq b_i, \qquad i = 1, 2, \cdots, m,$$

by the addition of slack variables.

The practical applications of this problem are many and varied. In Agricultural Economics, linear programming has been used for maximizing net revenues in farms, constructing minimum cost feeds for poultry and livestock, establishing minimum cost rates, and other problems.

2. *Solution Procedure*

Although several solution procedures have been suggested for the linear programming problem, the simplex method appears to be exclusively used in computers today and the following discussions are limited to this method. Essentially, this method consists of two phases:

1. Examining possible solutions to the equation

$$P\underline{x} = \underline{b}, \qquad \underline{x} \geq 0;$$

2. Finding that solution which maximizes (minimizes)

$$z = \underline{c}'\underline{x}.$$

If the equation

$$P\underline{x} = \underline{b}$$

contains m linearly independent equations with m unknowns, there exists only one unique solution and the maximization problem is trivial; if there are more than m equations, there is no solution. However, if there are $m < n$ equations (the usual case for practical problems) there are an infinite number of solutions. Specifically, such solutions are formed by giving to an arbitrary set of $(n - m)$ x's, some arbitrary values, and obtaining a unique solution for the remaining m x's.

To find one maximizing solution from such an infinite set would be practically impossible, but luckily there is a theorem which states that the maximizing solution is one of a subset of the above formed by assigning to the arbitrary set of $(n - m)$ x's the value *zero*. This reduces the number of eligible equations to C^n_m, which is still usually a rather large number. The number of eligible solutions is further limited by the restriction

$$x \geq 0,$$

but there is no easy method of determining if this restriction is fulfilled.

The simplex method provides us with a method of more quickly determining which of these is the maximizing solution. Essentially, the simplex method assumes that we have an initial solution satisfying all restrictions. Using this solution as a starting point, a set of numbers is calculated, to be referred to as the simplex vector, which indicates some other solutions, satisfying all restrictions which give a larger value of the maximizing function. Using this set of numbers, a new solution is determined, and the same procedure is applied. This is, then, an iterative technique which proceeds to the point where the simplex vector indicates that no solutions exist which produce a larger value to the maximizing function.

More specifically, the simplex vector consists of a set of numbers corresponding to each of the $(n - m)$ x's which are held to be zero in that particular solution. Each number indicates the change in the maximizing function which will result in setting equal to 1 (rather than zero) each of these x's. Since all x's must be non-negative it follows that any positive elements indicate that increasing the value of the corresponding x's would increase the maximizing function. We therefore increase to some positive value that x corresponding to the largest positive element in the simplex vector, to the point where one of the (non-zero) x's in the original solution does actually become zero. At this point we now have made an interchange of x's, one going from the zero set to the non-zero set and vice versa.

3. *Computing Procedures*

The most obvious method of arriving at the various solutions and finally at the maximizing solution is simply to apply the theory of the simplex vector:

1. Initially obtain some solution satisfying all restrictions. That is, determine a division of the x's into the two sets; the $(n - m)$ which are to be set at zero, and the remaining ones. The solution is then that of a set of simultaneous linear equations or a matrix inversion procedure. It shall be noted here that any such division of the variables will not necessarily result in a usable solution.

2. Obtain the simplex vector. This is obtained by a set of matrix manipulations, primarily multiplication and additions.

3. From the elements of this simplex vector select the largest positive value.

4. Determine, by finding the smallest positive of a set of ratios computed by any previously derived quantities, which of the x's in the original non-zero set will now become zero.

5. Rearrange the x's and go back to Step 1.

This is quite straightforward, and with high speed computers and available matrix manipulations programs this could certainly be done. However, not all of this is necessary. It turns out by a computational algorithm that the changes involved in going from one solution to another, that is, the interchange of two x's in the two sets, can be accomplished by a relatively simple algebraic procedure. This algorithm can be used with the simplex tableau format with which many are familiar. It exists in two forms, namely, (1) the "original" (original since it is not the revised one) in which there are elements in the tableau corresponding both to the zero and non-zero variable set and (2) the revised simplex in which elements corresponding only to the zero elements are listed.

The two are very similar indeed. It is, however, a little more difficult to construct the initial solution for the revised simplex.

We have neglected to discuss the determination of the first solution from which all subsequent solutions are obtained. In the case where the original problem contains slack variables, that is, where the restrictions are inequalities, one can easily take the initial solution that everything is "slack." Such a solution is easy to construct and it is easy to verify that it fills all restrictions. If, however, some of the restrictions are equalities, the procedure is to provide slack variables for these restrictions and then by some method force these slack variables to zero in subsequent iterations. This can be done by making the slack variables correspond to very large negative (costly) values in the maximizing function. However, in the revised simplex method this provides somewhat of a problem and special measures have to be taken to account for this.

4. *Problems of Obtaining Linear Programming Solutions by High Speed Computers*

The basic computing procedures for developing a linear programming

solution on a high speed computer are usually similar to the procedures used on a desk calculator, although it is possible that the high speed computer procedures are quite different from those used by hand. Below are listed several aspects of the computing procedures which are somewhat special to the high speed computer.

1. *Sorting and selection.* In the programming procedure one has to first select the largest positive number from a set of numbers (the simplex vector) and then, having done this, using a column of the matrix corresponding to this largest number, and another column of numbers produced by the computations, select the minimum positive ratio of the ratios obtained by dividing elements of these columns, thereby determining which direction to go for the next solution. Now it is very easy to select the largest of a set of numbers if one is looking at the set, but the computer cannot do this so easily. In the computer a procedure must be devised which essentially compares all the numbers to select the largest. This is a rather time-consuming task and in fact it has been found that the computer is usually much more expensive than a simple sorter for such procedures.

2. *Storage.* As can be seen, the simplex tableau as described above would contain a rather large number of elements; for example, a problem of 30 restrictions and 60 variables (which is not at all uncommon) results in a tableau containing approximately 1800 elements. The IBM 650 computer, as most of us know, contains only 2000 storage cells. Since the program to do the linear programming solution occupies some of these cells, one can easily see that a problem of this magnitude or larger could not be stored on the machine. Even when we get to the larger computers this presents somewhat of a problem, since the larger the computer the larger the demands on it. Even a computer with 32,000 storage units, (say the IBM 709) could not handle a problem with 100 restrictions and 400 variables.

3. *Accuracy.* When computing by hand one can readily follow the computations and determine when inaccuracies may arise and then take appropriate action. Thus, for example, if we find numbers becoming very small we simply increase the number of decimal places used. However, the computer is a completely automatic device; it will not (usually) stop if computations become inaccurate but will blithely go ahead and assume that everything is hunky-dory. Therefore, when operating such a device one must be careful to minimize the errors due to rounding.

4. *Completely self-contained routines.* The tremendous speeds and capacities of the modern computer makes it imperative that there be very little human interruption. Since modern day computers usually perform hundreds, if not thousands, of operations per second, the interruption by a human agent, which can usually do only a few decisions in a minute, costs a great deal in lost computing time. Also, since modern computers usually cost in the neighborhood of 50 to 400 dollars per hour to operate,

such human intervention becomes expensive in terms of money. It is therefore imperative to have a procedure which is, as much as possible, completely automatic. That is, one wants to insert the problem and the data into the machine and then let the machine grind away and finally produce the desired results.

5. *Methods of Alleviating Problems of Solving Linear Programming on Computers*

The problems mentioned in the preceding section are not necessarily insurmountable. Of course, as computers become larger and larger, and cheaper and cheaper per digit of calculation, and as they become more and more sophisticated, some of the above problems fade to insignificance. That is, even though a computer may be a very slow sorting device the tremendous speeds now available make this problem somewhat academic. However, if methods can be devised to solve some of these problems, they are certainly profitable both for the medium and large computers.

1. *Sorting and selection.* This problem has to some degree been alleviated by the new linear programming code for the IBM 650 as developed by Hartley and Grosvenor at Iowa State University. In this program the operator has a choice of allowing the 650 to do an iteration for every positive element appearing in the simplex vector. This produces a larger number of total iterations, but the saving in time afforded by not having to look for the largest in an entire set of vectors can actually reduce the total computation time. Also, this program allows the operator to preselect certain iterations, thereby allowing a human to enter himself into the program. This is, however, done at the beginning of the program and therefore the program need not be interrupted, which, as indicated, loses a great amount of time.

2. *Storage.* It is in the storage requirements that a great step forward can be made. It is possible to construct a vector (the "eta vector") of numbers which allows the transition from one iteration to the next by a matrix vector multiplication. This has been taken advantage of, again in the Hartley-Grosvenor program from Iowa State, to reduce storage requirements. In these programs the original matrix is on cards or tape and only the eta vectors are stored on the drum. Since the size of these vectors corresponds to the number of restrictions in the problem, one can store a large number of vectors, and thereby record a large number of iterations in the storage capacity of most computers. This advantage is somewhat tempered by the fact that the entire matrix must be fed into the machine through an input-output device for every iteration. Since input-output is very often a limiting factor in high speed computers this presents somewhat of a disadvantage. Therefore, this approach may not be very suitable for the very fast, very large computers.

3. *Accuracy.* At least two ways of increasing accuracy are available. In the first place, the data may be scaled such that large rounding errors can

be minimized. This is presently done by most computer programs for linear programming, and is not overly difficult. The other method is that of using a floating point arithmetic inside the computer. In this arithmetic the number of decimal places is stored as a separate quantity and the computations are always performed with a stated number of *digits*. This is a very fine method but presents several disadvantages, the main one being one of speed. In the 650, for example, the speed is probably one-tenth the speed of the normal arithmetic, and even if extra hardware is available speeds are somewhat reduced.

4. *Self-contained programs.* This has essentially been discussed. It can be seen that the Hartley-Grosvenor program is not a completely self-contained program in that the original matrix must be hand-fed into the machine for every iteration. This is, however, one case where the complete self-containment of other programs works a disadvantage whereas the hand-feeding works an advantage. It is therefore important to know for a particular problem what programs are available, how good they are, and what they will handle. For example, if one has a 650 and if the problem is very large, certainly the self-contained programs cannot handle the problem. On the other hand, if the problem is very small, advantage may be gained by using alternative programs.

6. *Odds and Ends*

It is well known by those who have used linear programming that obtaining one optimum solution is only part of the whole problem. Certainly the linear programming theory has provided the optimum solution, but very often in practical problems there is some question: "How good are the coefficients and other factors used in the problem?" We may have used a million dollar method for hundred dollar data. It is therefore often useful and interesting to examine alternate solutions which maybe are not quite as good as the mathematical optimum, but then the choice of solutions can be made by someone familiar with the data. It is also often of interest to construct price and resource maps which show the optimum programs with respect to changes in the availability of certain restrictions (right hand sides of the restrictions) and changes in prices (changes in the coefficients of the cost function). Again, the Hartley-Grosvenor code for the 650 provides an automatic method of doing the latter. The SCROL code for the IBM 704 appears to have several provisions for human intervention.

Non-linear programming is a subject which has recently become of greater interest. At present, some programs for this do appear, but their distribution is not yet wide enough to reach this writer. A method of solving a quadratic programming problem using theorems by Kuhn and Tucker and C. G. Hildreth have been developed by this writer but they are very slow and cumbersome and the size of problems permitted is quite restricted.

SYSTEMS OF SIMULTANEOUS EQUATIONS ON THE IBM 704 AND 709

HARRY EISENPRESS AND RICHARD J. FOOTE
International Business Machines Corp. and Connell and Company

METHODS for estimating the parameters of systems of simultaneous stochastic equations have been well known since the pioneering work at the Cowles Commission was published in 1950 (1)* and 1953 (2), and the publication of Klein's textbook in 1953 (3). However, the computational problems involved in the full-information maximum-likelihood solution of such systems were so formidable that until recently the largest system ever solved by this method was a 3-equation model with 9-12 parameters. Even the limited-information maximum-likelihood solution was sufficiently complicated to warrant the publication of a computational manual by Friedman and Foote in 1955 (4).

In 1959 a limited-information program for the IBM 704 became available, and in the fall of 1960 an extended version of this program will be issued, for both the 704 and 709, including the following estimation methods:

a. Limited-Information
b. Two-stage least-squares (5)
c. Full-Information, unrestricted
d. Full-Information, diagonal covariance matrix
e. Limited-Information subset

The program for the smaller 704 (8,192 core storage words and drums) can handle up to 30 equations in 30 dependent variables and 35 independent variables, with 1000 observations on each variable. For the larger 704 (32,768 core storage words, and no drums) and 709 (with the same capacity), these limits are 70, 70, 70, and 5000, respectively. The number of parameters that can be handled simultaneously in the full-information solution is for the present limited to 50 in the smaller machine and 100 on the larger. As more efficient matrix inversion routines for the 709 become available this number will be pushed upwards.

Alternative Methods of Estimation

The single-equation limited-information estimates may be computed using only a subset of the M_{zz} matrix, as is often necessary when the number of observations is relatively small. It is also possible to place restrictions on the limited-information coefficients, e.g., to make two coefficients

* Numbers in parentheses refer to references appended to this paper.

the same. To assist the investigator in the early stages of his work, when the econometric model is still being formulated, the program will accept an incomplete system, where the number of equations is less than the number of dependent variables. The program also can be adapted to fit several alternative formulations of each equation. With an incomplete system it is possible, if desired, to compute the limited-information subset solution. This solution could also be computed for parts of a complete system, where the full-information solution is not practicable because of program or time limitations.

Unfortunately, use of either the full-information or the limited-information subset requires that all of the predetermined variables in the system be included in the M_{zz} matrix. Moreover, it is not possible in one run to obtain a single-equation limited-information fit for some equations and a limited-information subset fit for other equations in the model. Instead the limited-information subset must be fit in a separate run. This adds to the cost for small subsets as several minutes of machine time are required in each instance to enter the program.

For complete systems the program will accept identities when it is desired to combine these equations with computed equations in order to compute the reduced-form system based on limited-information or two-stage least-squares. However, for the full-information solution the identities must be eliminated first, in order to avoid a singular M_{zz} matrix. The full-information solution is an iterative one, starting with the limited-information or two-stage least-squares solution as a first approximation. It uses the gradient method and Newton's method to maximize the likelihood which is a function of the parameters to be estimated. The process may be shortened by assuming *a priori* a diagonal covariance matrix for the disturbances. (This assumption may be hard to justify in many cases.)

In addition to the reduced-form system based on limited-information or two-stage least-squares the program also computes reduced form systems (a) based on full-information estimates and (b) as the direct least-squares solution of each reduced-form equation. In addition the program computes, for comparative purposes, the least-squares solution of each structural equation considering the first dependent variable in the equation as *the* dependent variable.

Coefficients that Relate to Certain Statistical Tests

A number of coefficients are computed that assist the analyst in appraising his results. These are as follows:

a. The von Neumann statistic[1] (6) D^2/S^2 to check serial correlation in the residuals. This is the ratio of the mean square successive difference to the variance and is computed for the residuals for the structural equations

[1] A test developed by Durbin and Watson (7) is preferred, as this applies directly to the unexplained residuals whereas the von Neumann statistic relates to serial cor-

for both the limited-information and the direct least-squares fit. A print-out of the actual residuals also is given.

b. Coefficients for the two phases of the Anderson-Rubin (8, page 56) test for the degree of identification. These are computed only for the limited-information fit. The statistic $T \log 1/L_1$ follows a χ^2 distribution and tests for over-identification. If non-significant results are obtained, the statistic $T \log 1/(L_1L_2)$ is used to test for a just identified system. If non-significant results are obtained, the system is under-identified.

c. The largest root of the characteristic equation. This is required for the solution of the limited-information fit and is printed-out as a guide to possible errors in the solution. This should lie between 0 and 1 but may exceed 1 slightly if some Z's are omitted from the M_{zz} matrix.[2] If M_{zz} is singular, this may exceed 1 by a substantial amount and wrong signs on the variances may be obtained.

d. The second largest root also is printed-out but is used only as a part of the Anderson-Rubin test described above. Both roots are obtained by an iterative solution and in some problems many iterations are required to obtain the second root. As this is of limited interest, this part of the program may be bypassed.

e. A print-out of the original data also is given.

Running Times

At present, only approximate running time estimates may be given. The first part of the program, including the single-equation estimation methods, takes about one minute per equation. However, a large amount of data or a large M_{zz} matrix will increase this time considerably. The full-information or limited-information subset solutions, for the small systems that have been run as test cases (3-5 equations, 9-15 parameters), take about 10 minutes more on the smaller 704 and about 20 minutes more on the larger machines. This difference between machines is accounted for largely by increased tape movements. The diagonal covariance specification for full-information reduces this time to about 7 and 12 minutes, respectively. One large system that has been run as a test case on the 709 (8 equations, 78 parameters) has taken several hours, but it is believed that this time can be shortened considerably by more careful specifications of the constants that control the iterative procedure.

Other Programs

Another program of interest in this area is the 709 Econometric Model Program (ECOMP) by C. L. Childress, based on work by R. L. Basmann,

relation in a variable. The Durbin-Watson test was not published until after Klein's book was written and Klein's book was used as a guide in preparing this program.

[2] This is true for the characteristic equation used in this solution. It is not true for other characteristic equations that frequently are used in such computations.

both of General Electric Company. This program consists of two parts. The first computes various regression coefficients, multiple correlation coefficients, covariances of regression coefficients, residuals and their auto-serial correlation coefficients, moments and correlations of all variables, auto-serial correlation coefficients of variables, and characteristic roots and vectors of the correlation matrix. The second part uses the information of the first part to compute two-stage least-squares estimates (here referred to as "generalized classical linear" estimates) for various structural equation specifications. The numbers of dependent and independent variables are each limited to 35 in each separate calculation (the data tape may have up to 1000 variables in total); the number of observations on each variable is limited to 70. For the investigator who wishes to examine more intensively the special information that this program provides, it can be a valuable supplement to the first program.

Recommended Procedures In Applied Research

Connell and Company has used the limited-information and two-stage least-squares 704 solutions to fit about a dozen equation systems since this program first became available. As a result, we have developed a fairly standardized procedure. We describe this in some detail as we believe it may be helpful to other research workers.

A. Choice of variables for the M_{zz} matrix. In almost all of our models, we have more Z's than observations. Hence, we have to choose a subset for the M_{zz} matrix. To do this, we compute a simple correlation matrix of all of the Z's in the system, being careful to see that no two of them are perfectly correlated, on the IBM 650. We then choose a subset for the M_{zz} matrix from among those that are least correlated, subject to the restriction that variables are included that are at least highly correlated with each of the Z's in each structural equation to be fit.

B. Listing of variables for the 704 fit. Normally, we wish to experiment with a number of alternative formulations for each structural equation to be fit. Hence, the program is stopped before the reduced-form equations are obtained and these are derived by algebra once the final set of structural equations has been determined. For this type of solution, variables are listed in the following order:

1. Endogenous variables included in the equations to be fit. These must be listed in an order such that in each equation the variable whose coefficient is to be normalized has the lowest number.

2. Dummy endogenous variables required to make the total number of endogenous variables equal to the number of equations to be fit. Obviously, no data are required for these.

3. Combinations of two or more endogenous variables or of one or more endogenous variables with one or more predetermined variables.

These are used when we wish to specify equality of coefficients on two or more variables.

4. Predetermined variables included in the M_{zz} matrix.

5. Other predetermined variables or combinations of predetermined variables included in the equations to be fit.

C. Choice of equations from among those fit. As noted above, we frequently use a number of alternative formulations of each structural equation to be fit and for each of these we have a fit by (1) direct least-squares, (2) limited-information, and (3) two-stage least-squares. We normally choose from among the two last-named solutions on the basis of signs on the coefficients that are consistent with economic expectations and goodness of fit as measured by the standard error of estimate. Unfortunately the latter is not given for two-stage least-squares, but it may be surmised by comparison of the regression coefficients with the other two methods of fit.

In some cases, none of the results are consistent with economic expectations. Here, we resort to scatter diagrams, least-squares fits on the IBM 650, or use of a simple trend or average, unless we decide to reformulate the entire model.

As noted above, once the final model has been determined, we obtain the reduced-form equations or their equivalent by a direct algebraic solution.

D. Use of full-information or limited-information subsets. These approaches require a model that is exactly formulated and, as noted above, may be expensive to fit. We plan to use these methods only after satisfactory solutions have been obtained by methods that are cheaper to fit and that allow a high degree of experimentation.

References

(1) Tjalling C. Koopmans, ed., *Statistical Inference in Dynamic Economic Models* (Cowles Commission Mono. 10), New York, 1950.

(2) William C. Hood and Tjalling C. Koopmans, ed., *Studies in Econometric Method* (Cowles Commission Mono. 14), New York, 1953.

(3) Lawrence R. Klein, *A Textbook of Econometrics,* Evanston, 1953.

(4) Joan Friedman and Richard J. Foote, *Computational Methods for Handling Systems of Simultaneous Equations* (U.S. Dept. Agr., Agr. Hb. No. 94), Washington, 1955.

(5) H. Theil, *Economic Forecasts and Policy,* Amsterdam, 1958, pp. 223-40, 334-61.

(6) B. I. Hart and J. von Neumann, "Tabulation of the Probabilities for the Ratio of the Mean Square Difference to the Variance," *Ann. Math. Stat.,* 1942, 13:207-14.

(7) J. Durbin and G. S. Watson, "Testing for Serial Correlation in Least Squares Regression," *Biometrika,* 1951, 38 (1-2):159-77.

(8) T. W. Anderson and Herman Rubin, "Estimation of the Parameters of a Single Equation in a Complete System of Stochastic Equations," *Ann. Math. Stat.,* 1949, 20:46-63.

REGRESSION AND SYSTEMS OF EQUATIONS ANALYSIS ON THE IBM-650

HARLOW W. HALVORSON
University of Wisconsin

IN VIEW of recent rapid growth in the technology of computers, perhaps anything one can say about their use for statistical analysis will be highly dated. As I think back over our experience at Wisconsin, I recall that it was only eight years ago that we were still using a calculating punch, and only five years ago we were using card programmed calculators. At that time the IBM-650 became available and with it much promise. But we judge things in terms of our available alternatives. Today many researchers are looking forward to replacement of computers of this magnitude with larger and speedier equipment. The growth of technology has made computers of this capacity comparatively inefficient and expensive. In spite of this, such computers have many satisfactory characteristics and will probably be in use for a few years in many institutions.

I have been bothered by the reference in my assigned title to "small" computers. I haven't been able to spell out a very satisfactory definition of a small computer primarily because the growth of technology might well make it inadequate very soon. However, in what follows I refer almost exclusively to an electronic tube type computer with some modest storage capacity, probably of the drum variety, with the possibility of an additional small amount of core storage, capable of operating on internally stored programs. This is the 650 and it is a relatively low power computer both in storage and speed compared with the IBM 700 series or Univac or others.

In this statement I deal mainly with correlation and regression programs. I have tried to bring together information on a number of programs available for the IBM 650 since it seems to be available to a large number of research workers in Agricultural Economics. However, there is a new generation of "small" computers soon to come on the market but which, for the most part, are not yet available. Re-programming will be necessary for these to take advantage of their special characteristics. In the concluding section I make a few brief comments on computational uses of the 650 in systems of equations analysis.

In the discussion which follows I refer first to programs usable on the "basic 650" which is a drum storage electronic tube computer with card read and punch unit, and second, to several programs available for the "augmented 650." The latter is a basic machine with one or more units of

additional equipment attached, such as index registers, automatic floating decimal, some core storage, a print unit, and up to four tape units. The additional cost of augmenting a basic 650 seems to be relatively high and except for the index register and floating point features, probably not worthwhile for correlation and regression work. If problems are sufficiently large to require much tape storage and core for speeded computations, these probably can be done more cheaply on larger machines. Some recent calculations by our Numerical Analysis Laboratory suggest that if a large computer can be kept even modestly well occupied, the cost per unit of calculation may be substantially reduced by more modern larger-scale computers.

Programmers must be adept at selecting analytical methods which will take advantage of the unique features built into the computer at hand. This, of course, means that programs developed for one machine type will not work on another. For the 650, programs for the basic machine will work on an augmented unit (and at relatively higher cost), but not vice versa. Potential users of borrowed 650 programs should check the machine characteristics required by a program.

Because of limited storage capacity and consequent inability to store both program and large amounts of data, many programs are developed in stages or as parts of an integrated system. Thus, multiple regression programs involving more than 10 variables are generally handled in two or more parts or phases. In the first phase the sums and squares and products and relevant simple correlation statistics are computed and punched. In the second (and possibly the third) phase matrix inversion takes place using punched output from the previous phase and then regression statistics are computed. However, for small problems—say up to 10 variables—it is possible to do all phases of the standard regression and correlation problem in a single operation.

In general it seems desirable to have programs flexible enough to permit users to specify the type of answer material desired. Some programs do this through suitable control information punched on control cards, while other are quite inflexible.

Programs often have special features which make them attractive for particular purposes. For example, some permit introduction of subroutines to convert data to logs or some other transformation, or permit a reordering of input variables. Regardless of their special characteristics most of the programs which I have checked fairly closely give consistent answers for most statistics up to the seventh digit even for regression problems up to 25 variables. Consequently considerations of accuracy did not seem to be significant among the programs to be discussed. However, where matrices approach singularity, differences in accuracy of the matrix inversion routines may show up but such cases were not examined.

Timing information useful for determining probable machine time and costs for the main programs to be described is presented in an appendix.

A. *Programs for the Basic 650*

Most attention has been given to programs devised for the basic 650 for two reasons. First, this is the most commonly available machine. Second, programs for augmented machines have little additional to offer in the way of speed or output than the best program for a basic machine. Thus, at the higher per hour rate, costs on an augmented machine will be higher than necessary.

1. *For small problems of 10 variables or less*

Two programs have been tested which are fairly useful for small problems. In each case the complete set of answers is provided with one pass of data through the read-punch unit.

a. *The Mississippi (Tramel) Programs.*[1] T. E. Tramel, of Mississippi, has developed a series of six separate programs designed to handle problems of one to six independent variables. For a given program, successive problems may be loaded and computed without reloading the program and output is suitably identified to distinguish the answers of the separate problems. However, the number of observations in each problem must be determined in advance and punched in its control card. Changing to a problem with a different number of variables requires loading a new program, which takes about one minute.

One especially attractive feature of this system of programs is the fact that options are included which permit, through simple punching of the control cards, transforming selected independent variables to logarithms or powers and computing a linear regression on these transformed variables. For example, the program for six independent variables has 13 variations or special functions which may be selected in addition to the possibility of making certain logarithmic transformations.

A further attractive and important feature is that output can be used directly as input in a multiple covariance program designed to analyze the regression of several groups of data into the between and within group components.

In addition to these key programs in the Mississippi system, further programs designed to reduce equations to fewer terms and to compute successive differences of input information are available. These features should combine to make this system of programs useful to researchers.

b. *The Wisconsin (Halvorson) Program.* Since much of the correlation and regression work in Agricultural Economics involves 10 variables or

[1] Professor Thomas E. Tramel has been kind enough to send copies of his programs and instructions for their use as well as answer a few questions about them.

less and since it is often desirable to compute estimated values along with the Watson-Durbin test, I have put together a program designed to provide the most used correlation and regression statistics with one pass of the data deck, and to derive the estimated values and Watson-Durbin statistic immediately with a second pass of the data while the computed information is still on the drum.

Statistics punched include repression constants and standard errors, the Beta coefficients, the multiple and partial coefficients of determination with the dependent variable, *t*-statistics for the regression coefficients, means and matrix of simple correlation coefficients. Sums of squares and products are not punched as they are in the Tramel program, but a subroutine could be added for this. The number of observations do not have to be specified in advance, but the maximum size of a sum of squares permitted is 10 digits. Consequently, for time series work with four digit input, somewhat over 100 observations can usually be handled. The Watson-Durbin test assumes that the data are loaded in time series sequence.

This program is somewhat slower than some of the programs yet to be discussed, but for numerous small problems in which the number of variables and number of observations may change from problem to problem it has some advantages.

2. *For larger problems—up to 25 variables*

These programs involve two or more phases in which punch-out from the first phase becomes input for later stages. In the first stage the simple correlation matrix and related material are computed. In the later stage(s) matrix inversion takes place and regression statistics are computed. These programs permit the selection and reordering of variables from phase 1. The two or more stage operation permits the examination of results of the simple correlation analysis to permit appropriate selection of input variables in a multiple regression. Each of the programs referred to in this section has some feature making it especially useful for certain purposes or types of user.

a. *The Beaton-Harvard programs.*[2] This is the best general 2-stage program I have yet encountered—whether for the basic or the augmented 650. It is nearly as fast as those which use core storage and index registers; it includes a number of output options for the first stage which may be selected by punching of control cards; it involves minimum card handling; input fields may be either standard 8-word form or be defined by simple control cards properly punched, thus minimizing board wiring and card punching problems; and a more complete output is provided than

[2] These programs were called to my attention by Don Farrar and Guy Orcutt, Dept. of Economics, University of Wisconsin.

any other program I have used. One feature which some users may regard as a shortcoming is that most of the multiple regression output is presented in fixed decimal scaled to four points. Some users would prefer to have all output in floating point form and position their own decimal points, or carry a larger number of decimals.

Phase 1, the simple correlation routine, will handle up to 55 variables, and phase 2, the multiple regression routine, up to 25 variables. In a given multiple regression of N independent variables the results for separate regressions on the dependent, adding one variable at a time, will be punched automatically proceeding from the first independent and adding successive variables up to the nth in order. Thus in a 4-variable problem, the results of a two, a three, and a four variable analysis will be punched. Examination of the successive equations and the reduction in unexplained variance with the addition of each variable is an interesting and sometimes useful aspect of this program.

b. *The IBM Regression Analysis Series.*[3] This series of programs for the basic 650 seems particularly suited to a statistical analysis unit which is charged with servicing a wide variety of persons, many of whom only occasionally come in contact with computer problems, and where individual researchers have little or no contact with the computational process. The main virture of this series is that each kind of answer is headed by a printed description of what it is. Thus the computer supervisor does not have to take time to explain results to users.

The current system of programs involves three stages:

Phase 1 (290-1) punches means, standard deviations and correlation coefficients in fixed point annotated form for users, and in floating point for input in subsequent phases.

Phase 2 (283) is a double precision floating point matrix inversion routine which is used to invert the r_{ij} matrix derived in Phase 1. For large matrices, double precision operation may be important, but in some test problems up to 20 variables I was able to detect differences only in the seventh and eighth digits. On the other hand, the computing time of double precision operation is more than doubled.

One shortcoming of this second stage is that proper problem identification is not carried on output cards. If a number of problems are being run, results could get mixed up rather easily unless special care is exercised.

---

[3] I am indebted to Hyman Weingarten, Agricultural Marketing Service, U. S. Dept. of Agriculture, for simplifying the task of working through the various phases of this system of programs. For a more complete description of them and other programs useful to economists, see his article "Getting the Computational Job Done Electronically," *Agr. Econ. Res.*, Jan. 1960, pp. 21-24.

Phase 3 (290-3) is a rapid operation using floated means and standard deviations of phase 1 and the inverse of the correlation matrix from phase 2 to give selected regression statistics. Output of this phase is annotated.

It has seemed to me that the considerable card handling and relatively slow speed of this program will be important disadvantages to some potential users. Where researchers or their assistants act as machine operators, complexity of board wiring and card handling mitigate against it. A fair amount of time is involved in getting set up to use this series of programs. But once functioning properly it gives a nice display of output.

A number of other programs for multiple regression have come to my attention during the last few years. The most intriguing of these is one by Efroymson and Schricher referred to as Step-Wise Multiple Regression.[4] In it a preassigned F level is selected, variables are tested and those making greatest reduction in unexplained variance are added to the equation in step-wise fashion from the most to the least significant. Variables entering the equation early may later be dropped if their contribution at a later stage is determined to be lower than the specified F level. When complete, the analysis contains only significant variables. I note that a recent Master's thesis by Nordhauser at Purdue probably used a variant of this program developed for a larger computer.

I used this program on two problems several years ago but thought, after shifting the position of data within fields, that it seemed quite sensitive to round-off problems and assumed that this was probably due to its operation in fixed point mode. But more than this, the logic of this approach raises some questions. The procedure seems somewhat analogous to straining a set of possible relationships through a sieve and special care should be used in interpreting results.

B. *Programs for the Augmented 650*

Several programs are available, but because of the relatively small number of such computers in use and the liklihood of even fewer in the future, I have not tested and timed any but those developed and used in our Numerical Analysis Laboratory.

1. *Simple Correlation Routines*

A Wisconsin routine which is available accepts four digit observations and will handle up to 55 variables. Output is mixed fixed and floating point with the sums, squares and products in the latter form. Its speed is only slightly faster than Phase 1 of the Beaton-Harvard program.

The Oklahoma program, Cor IV, seems to be similar to the Wisconsin

[4] Available through Esso Research and Engineering Company, P.O. Box 215, Linden, N.J.

routine, although its description suggests it may be more directly useful than ours since its output is in a form suitable for direct loading into a matrix inversion routine.

2. *Regression Programs*

I believe most problems of more than 7-8 variables or those involving large numbers of observations should be handled as a two-stage operation or should at least use a program which punches sums, squares and products in a convenient form for possible later use. However, we do have a straightforward regression routine which will handle problems up to 37 variables and up to 100 sets of observations of four digit data or 10,000 sets of three digit data. Because it was written in conjunction with an analysis of variance program, the sum of squares of the dependent variable associated with each independent are punched along with the *b*'s and *F* values. In addition, the sum of squares associated with up to eight sets of variables in sequence, such as 3 through 8, 5 through 7, etc., can also be specified. Reordering of data may also be called for. However, a number of statistics ordinarily desired by researchers are not provided by this program and hence its use will be quite limited.

Space prevents detailed examination of additional programs. IBM maintains a library of 650 programs they have developed or which have been submitted to them by 650 users. Each 650 installation will have a file of abstracts of such programs and the detailed descriptions and copy of the program are available on request.

Before leaving this subject I should call attention to two programs which I have not had an opportunity to study in detail but which prospective users may wish to examine. The Shell Oil series of regression programs RAP and TRAP, like those of Tramel, permit transformation of variables. A lengthy manual describes the series in detail. The Statistical Laboratory at the Washington State College has a program listed in the IBM Library which seems to be quite comprehensive. Our imminent conversion to a larger computer has deterred me from looking into them, but installations with augmented 650's may find them well suited to their needs.

II

To my knowledge there have been no programs developed for complete handling of a systems of equations analysis on the 650. The problem is essentially a lack of storage capacity. I have little doubt that small models could be programmed for the basic 650, particularly if the first stage of computing sums and squares were handled separately. Matrix inversion and multiplication programs are available in most laboratories and programs could be developed around these rather easily. However,

TABLE 1. MACHINE TIME REQUIREMENTS FOR TWO "BASIC 650" CORRELATION-REGRESSION PROGRAMS SUITED FOR SMALL PROBLEMS[a,b]

No. of Variables	Mississippi-Tramel	Wisconsin-Halvorson
	Variable: Fixed	Variable: Fixed
	Seconds	
3	$1.2N+19$	$.9N+27$
4	$2.7N+33$	$1.4N+49$
5	$4.0N+49$	$1.9N+96$
6	$5.3N+69$	$2.6N+129$
7	$6.6N+93$	$3.4N+186$
8		$4.3N+258$
9		$5.3N+349$
10		$6.4N+458$

[a] Plus time to load program, which is about one minute in each case. The Wisconsin program is "general" in that the program manufactures its own addresses depending on number of variables. Tramel programs are separate for each specified number of variables.

[b] To illustrate, for a 3 variable problem (2 independent variables) of 50 sets of observations

Tramel $= 1.2 \times 50 + 19 = 79$ seconds
Wis. $= .9 \times 50 + 27 = 72$ seconds

because of the large amounts of intermediate storage needed, larger models will quickly run out of drum space. And since the hand computational cost for small problems is rather low, programming them is hardly worth the effort unless a large number are to be run.

Because of the ready availability of matrix inversion and matrix multiplication routines it seems sensible to attempt to establish procedures whereby results from these routines can be fitted into a system of rounding out the analysis by hand with desk calculators. Even this is perhaps hardly worth the effort in view of the availability of the Eisenpress-Foote program for the 704. Exploratory work using regression programs referred to above before subjecting the data to analysis in complex models will often save investigators from false starts and wasted dollars.

As a concluding comment I would like to suggest that many program descriptions still leave much to be desired from the standpoint of both understanding the basic logic of their construction and perhaps fine but nevertheless troublesome points about their use. Points which seem obvious to the original programmer may be perplexing indeed to a program user. Trivial details often become difficult hurdles. It may be better for program descriptions to be painfully detailed than too concise. Once mastered, users seldom refer to them again, except with regard to key features, but first few uses of a complicated series of programs inadequately described, can be frustrating indeed.

Appendix

In order to provide information on probable machine time necessary to handle problems of different size, data for 25 artificial variables of 4 digits

TABLE 2. MACHINE TIME REQUIREMENTS FOR TWO "BASIC 650" CORRELATION-REGRESSION PROGRAMS CAPABLE OF HANDLING UP TO 25 VARIABLES.[a]

Beaton-Harvard Program

No. of Variables	Phase 1[b]	Phase 2	Overall
	Variable:Fixed	Fixed	Variable:Fixed
	Seconds		
5	$.8N+10$	55	$.8N+65$
10	$2.1N+30$	205	$2.1N+235$
15	$4.2N+63$	498	$4.2N+561$
20	$6.8N+95$	960	$6.8N+1055$

IBM-290 Series

No. of Variables	Phase 1[b]	Phase 2	Phase 3	Overall
	Variable:Fixed	Fixed	Fixed	Variable:Fixed
	Seconds			
5	$1.8N+52$	41	40	$1.8N+130$
10	$3.5N+115$	324	55	$3.5N+494$
15	$6.4N+145$	1095	70	$6.4N+1310$
20	$10.1N+180$	2555	90	$10.1N+2825$

[a] Plus time to load program of about one minute for each phase.
[b] Fixed time in phase 1 will vary depending on output information selected.

each were compiled from a table of random numbers. These were used to time the various machine operations involved in four programs which semed well suited to Agricultural Economics research.

Variable time is that associated with reading data and summing and squaring the individual observations and this has been reduced to time per set of observations. Thus a 5 variable problem with N of 20 will take twice as much variable time as one with N of 10.

The matrix inversion process occupies a substantial share of the fixed time of Table 1 and most of phase 2 of Table 2, particularly for problems greater than 10 variables.

I have not had time to examine the matrix inversion subroutines in the several programs. However it is likely that the double precision IBM routine gives better estimates of the inverse for cases approaching singularity.

PROBLEMS OF METHOD IN AGRICULTURAL ECONOMICS RESEARCH

CHAIRMAN: JOHN M. BREWSTER, AGRICULTURAL RESEARCH SERVICE, USDA

THE IDENTIFICATION OF PROBLEMS IN AGRICULTURAL ECONOMICS RESEARCH*

A. N. HALTER
University of Kentucky

THE MOST important mental requirements for doing successful research are curiosity and love of research. One of the main incentives for research is the desire to win the esteem of one's associates. The chief reward from research is the thrill of discovery. Thus at the start, the task of identifying a workable problem appears to be a rather drab prerequisite to research. However, in agricultural economics we have been blessed with scholars who are willing to identify the problems to which they feel the members of the profession should orientate their research efforts. The latest attempts at identifying problems are those made by the members of a subcommittee of the Social Science Research Council Committee on Agricultural Economics which appeared in the August, 1959, issue of the *Journal*.[1] Thus in regard to formulating problems my paper comes after the "final curtain." Hence, I will venture to go behind the "scenes" and try to report to the audience what I interpret has gone on "backstage." In reporting on the "backstage" activities you understand that I didn't see any of the "dress rehearsals" nor have I talked to members of the production personally.

Any "backstage" has immovable fixtures which serve for many plays and different actors. Likewise in the identification of problems there are some immovable points of view which give rise to particular kinds of problems. Hence in this paper I will first present a heuristic device for examining most points of view. This device will serve the useful purpose of (1) classifying problems and (2) making explicit where "short circuits" of facts and "frayed ropes" of theory can give rise to pseudo-problems. Second, I will attempt to show how the problems that the subcommittee

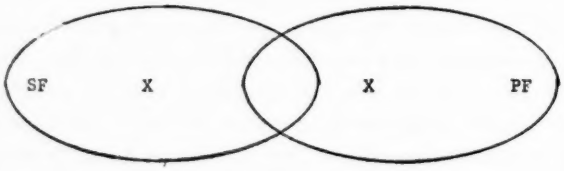
* The author would like to acknowledge the advice of P. R. Johnson, H. H. Jack and J. W. Hubbard in preparing this paper. However, I am fully responsible for the inadequacies that remain.

[1] George K. Brinegar, Kenneth L. Bachman, and Herman M. Southworth, "Reorientations in Research in Agricultural Economics," *J. Farm Econ.*, 41:600-19 (Aug. 1959). One can rarely pick up a research paper or peer into the *Journal* without seeing a mass of problems in the process of being identified. This paper is not intended to be a review of that literature.

has identified can be examined with this device. Finally, I will present a point of view which I believe clarifies certain issues and provides a new way of approaching research problems in agricultural economics.

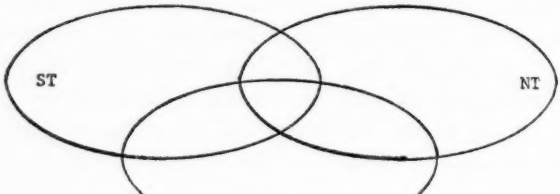
Device for Depicting Points of View

First consider the realm of the facts, that collection of actual happenings which everyone can experience. Let us divide this collection into at least two parts, social and physical (natural) and represent them diagrammatically by two intersecting elipses. Call the left one *SF* denoting social facts and the right one *PF* for physical (natural) facts. Now if your point



of view tells you there are particular kinds of facts, then you designate such by putting a cross (*X*) in the appropriate place. For example, I believe there are both kinds of facts, hence, I would place a cross in each lune. A cross (*X*) in the intersection (the lens) would imply that there are some *SF* which are also *PF*. However, cross hatching the lens means that there are no *SF* which are *PF*.[2] Leaving the lens or lune blank means that the proponents of the point of view make no commitment regarding the existence or nonexistence of these kinds of facts.

Second, consider the interpretation placed upon facts or what will be called the domain of theory. Let us divide this domain into three parts: (1) Social or societal theory, (2) Physical or natural theory and (3) Normative theory. These can be represented as three intersecting elipses. Call the left one *ST* for societal theory, which includes propositions in



only the indicative mood describing and explaining social facts. The middle ellipse, labeled *PT* for physical theory, consists of propositions also in the indicative mood that describe and explain physical or natural

[2] Crosshatching a lune implies there are no such facts.

facts. Finally, the remaining ellipse, denoted as *NT* for normative theory, consists of propositions in the indicative and the imperative moods which state either what the ends of individuals and society are or what they should be.[3] Now the intersection between *ST* and *NT* can:

(1) contain a cross (*X*) implying that the particular societal theory considers existing ends necessary for describing and explaining social facts. (These propositions are in the indicative mood.)

(2) be cross-hatched implying that existing ends are not necessary for describing and explaining *SF*.

(3) be blank. Either case (2) or (3) combined with a cross (*X*) in the lune of *NT* implies that the normative theory states propositions in only the imperative mood. The intersection of *PT* and *NT* can be given a similar interpretation. The intersection of *PT* and *ST* are those propositions in the indicative mood which describe and explain *SF* and/or *PF*. The intersection of *ST*, *PT*, and *NT* are those propositions in the indicative mood which use existing ends in describing and explaining *SF* and/or *PF*. Understand that only the intersection with *NT* contains propositions in the indicative mood, the lune of *NT* contains only propositions in the imperative mood.

Thirdly, let us consider the region of metaphysics which can be represented by one ellipse containing those propositions taken for granted before the physical and/or societal theories can explain *SF* and *PF* or before normative theory can prescribe ends.[4] To show the relation between this ellipse and the other two sets, let us construct as in Diagram I a hierarchy of order between them. Thus metaphysics is of the highest order, followed by theory with facts at the bottom. The relation of each level to the other two can be indicated by sets of directed lines (arrows indicate direction of relation). Between the metaphysical and theoretical levels lines labeled *P* for the presupposing relations can be indicated to connect the presuppositions with the theory. Between the theoretical and the factual levels, lines can be drawn (labeled *E* in Diagram I) which denote the methodological relation of explaining.[5]

Finally a fourth level can be indicated between the levels of theory and fact by an ellipse which denotes those propositions of technology, i.e., those of medicine, engineering, and, depending upon your point of view, agricultural economics. The lines labeled *C* between any theory and technology imply a contributory relation, i.e., technology may use propo-

[3] Indicative pertains to that mood of the verb which represents a concern with an objective fact. Imperative pertains to that mood which is expressive of a command.

[4] Cf. A. N. Halter, "A Metaphysical Hypothesis," *J. Farm Econ.*, 40:1871-74 (Dec. 1958).

[5] The arrow on the line labeled *E* on the diagram denotes direction(s) of the relation(s), here induction and deduction.

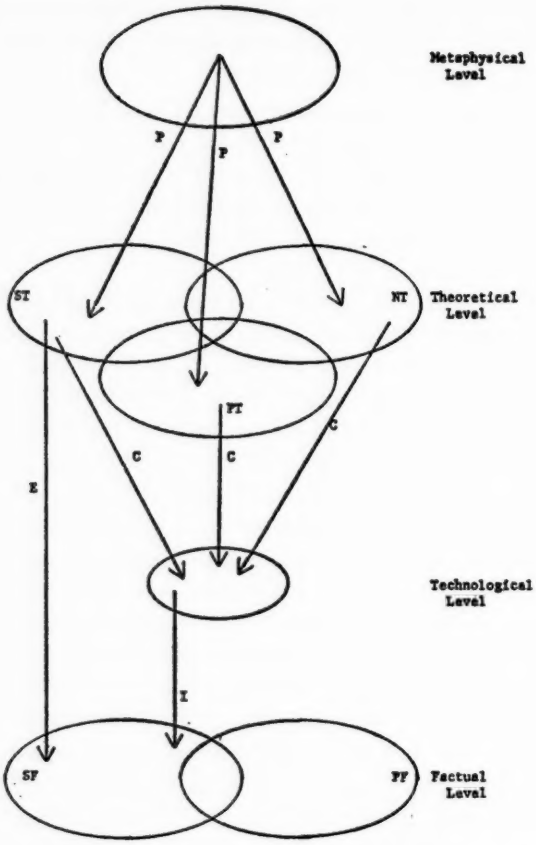


DIAGRAM 1. DEVICE FOR DEPICTING POINTS OF VIEW.

sitions of *ST* and/or *PT* in the indicative mood with propositions of *NT* in the imperative mood to derive propositions which can influence the social facts—*SF*. Hence a line labeled *I* between technology and *SF* implies an influence relation, i.e., technology changes *SF*.

Now in constructing this hierarchy a means for classifying problems for research can be evolved. Thus the four levels provide four kinds of problems: (1) metaphysical, (2) theoretical, (3) practical or technological and (4) factual. Transition between the levels involves a chain of methodological problems. Thus each line between the levels implies a particular set of methodological problems, e.g., the *E* relations imply the methodological problems of science, the *I* relations imply the problems of method in teaching, preaching and "politicking."[6]

[6] The *P* relations between social or physical and metaphysics imply the problems that philosophy of science study and the *C* relations imply the technical problems of crafts, e.g. linear programming in current usage.

Now that the structure for picturing a point of view has been developed let us apply it to a particular one and see what it shows. The subcommittee referred to earlier stated their belief that F. S. C. Northrop's *(The) Logic of the Sciences and the Humanities* provides a "frame of reference" for analyzing the intellectual efforts of agricultural economists.[7] Therefore, before examining the subcommittee's view, let us gain some facility in applying the device by examining the view set forth in Northrop.

Northrop separates theory into three kinds: (1) theory of natural science, (2) theory of social science and (3) normative theory of the humanities and social science. The first he says is basic to such discoveries as the atomic bomb, the second designates the *de facto* state of affairs in society and the third designates "the humanistic and social end, the correct or good form of social organization, not yet perfectly actualized in fact, at which we should aim."[8] His claim that there are social and physical facts is clear from the following quotation:

> The only difference between the theory of natural science and the factual theories of social science is that the former applies the traditional method of the natural sciences to the facts of nature, whereas the latter applies it to the facts of culture and society.

To build up the relation between theory and what we have called metaphysics we need to consider several passages from Northrop's book.

First he argues that normative theory can be verified. He says

> . . . that the scientific method for verifying normative social theory cannot be that for verifying the theory of natural science or factual social theory. For otherwise normative social theory and factual social theory would be identical, and the distinction . . . would evaporate.[9]

Second he says that there is an empirical connection between the postulates of nature or natural man and normative theory. It is this connection which provides the method by which the correct or most adequate, normative social theory can be picked out from among the possible normative social theories.

Let us picture what we have up to now in a diagram showing the theoretical and factual levels of Northrop's view (Diagram 2).[10] The cross in the lunes at the fact level indicates he believes both exist; however, the blank lens means he made no commitment concerning the intersection. The cross in the lens between *PT* and *NT* indicates the existence of nor-

[7] Brinegar, *et. al., op. cit.*, p. 618.

[8] F. S. C. Northrop, *The Logic of the Sciences and the Humanities* (New York: Macmillan Co., 1947), p. 329.

[9] *Ibid.*, p. 329. This point is well taken. The equating of normative and predictive theory is a common confusion in agricultural economics literature.

[10] Both this and the way in which Northrop presents his view are abstract. However, Northrop (perhaps intentionally) presents no examples specific enough to refute his view at a more concrete level.

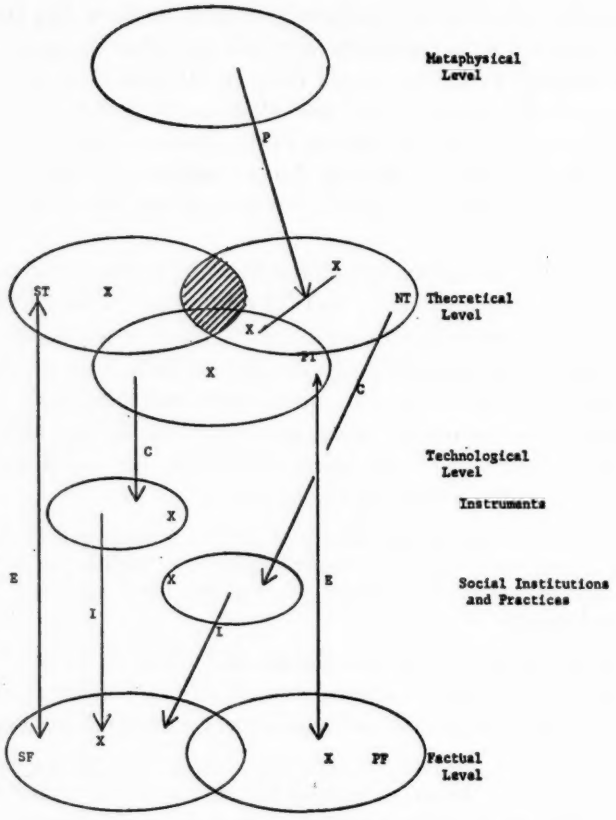


DIAGRAM 2. F. S. C. NORTHROP'S POINT OF VIEW.

mative postulates of nature and natural man.[11] The blank lens of *ST* and *PT* is consistent with the blank lens of *SF* and *PF*. That there is a connection between the postulates of natural man and normative theory can be shown by a line drawn between the two crosses. To justify this connection one must look to the metaphysical level. While Northrop does not use the word metaphysical there is little doubt that he is making a presupposition when he says:

> The philosophy defining a particular normative social theory has two apparently paradoxical properties of designating both an "ought" for culture which introduces choices, moral values and ideals, and an "is" for nature which permits verification.

Thus we can add to our diagram the metaphysical level and a line of presupposition to the connection between natural man and normative

[11] From this and a Northrop diagram I inferred that the lens between *ST* and *NT* must be cross-hatched. *Ibid.*, p. 339.

theory. In philosophical literature this metaphysical relation is called the "naturalistic fallacy." According to G. E. Moore these so-called naturalistic truths which Northrop says are verifiable assert a relation between an existing thing and an intrinsically "good" thing.[12] That is, according to Moore, any attempt to define the "good" in terms of the actual is fallacious and hence no scientific method can be formulated to prove or disprove assertions making attributions of "good."

To complete Northrop's view I have inserted the level of technology.[13] He makes a distinction between technological instruments and social techniques. Thus, only physical theory contributes to technological development while only normative theory contributes to the institution of social practices. I conclude that he claims: (1) that engineering has no normative aspect and (2) that social theories which explain social facts do not contribute to the formulation of social institutions and practices. However, I do not understand why on one hand physical theory contributes to instrument technology while on the other social theory does not contribute to the practices and institutions which influence social facts. Since Northrop's purpose was mainly that of justifying the metaphysical presupposition to which I referred above, he may have overlooked this latter point. However, that examining his view in this pictorial way leads to questions of omission shows the merit of the device.

Based upon the above demonstration, I would be more reluctant than the subcommittee to recommend Northrop's "frame of reference" for analyzing agricultural economists' efforts. My belief that the subcommittee did not in fact accept Northrop's point of view in identifying problems will be considered in the following section.

The Subcommittee's Problems

Time does not permit examining each problem identified by the subcommittee and hence I will consider only their first, technological change. I have presented in Diagram 3 my conception of the subcommittee's point of view. In order that you can follow the discussion I have numbered each line and will provide, in that sequence, direct quotes to bear witness to my conception.

(1), (2), (3) That physical theory and existing ends contribute to technological instruments which in turn influence social facts: "Technological change, defined as the effects secondary to the accumulation and application of knowledge, is at once the source of hope for the future and the cause of most of the adjustment problems faced in the present."

(4) That theory springs from the facts by induction: "An array of useful

---

[12] G. E. Moore, *Ethics* (Oxford: Oxford Univ. Press, 1912).

[13] I inferred this from a diagram, Northrop, *op. cit.*, p. 339.

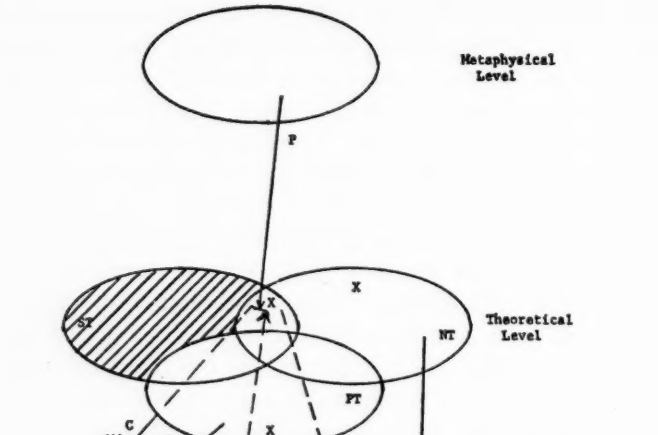


DIAGRAM 3. SUBCOMMITTEE'S POINT OF VIEW

questions center on the measurement of technological change. These questions concern levels and rates of change, and are significant at all degrees of aggregation. A second interest area concerns the factors that are strategic, at various times in various societies and industries, in determining the development and adoption of technology."

(5) That valuations are basic to social theory and their role in formulation of social techniques: ". . . related is the question of relevant beliefs and value systems of farm and nonfarm people in an increasingly specialized, highly technical system of agricultural production. Are modifications occurring in the image of the farmers' role as regards, for example, the scope of independence of management decision that is feasible, or as regards the degree of personal responsibility for economic security in a rapidly changing world? Shifts in value patterns related to such things can enlarge the range of acceptable choices in responding to problems that accompany technological advances."

(6) (7) That imperative ends from a normative theory contribute to social techniques which influence social facts: "On the side of income distribution there is need for more accurate measurement of the incidence of the gains and losses to various groups from new technology. It is not enough to say that *all society* gains in the long run. Interest in the question of incidence implies interest in how to shift the gains and losses flowing from technological change. Thus questions arise concerning how to control the impacts of technological change and how to shift them."[14]

To maintain that this is the way most agricultural economists view the problem of technological change and perhaps most other problems would imply a knowledge beyond my capacity. However, I would ask, now that the viewpoint is exposed by the structure of the device, are there weaknesses which could give rise to pseudo-problems?

Let us consider the circuit (2), (3), (4) or as the subcommittee called it the "Dr. Jekyll and Mr. Hyde facets."[15] This conception considers existing ends as basic to technological change and to explaining social facts. In this regard Northrup points out, "As long as valuations are taken as the fundamental concept of the science, an economic dynamics will be impossible for two reasons."[16] These he says are: (1) the subjective relative character of valuations necessitates leaving the state of a system at a given time unprecisely designated and (2) the failure of the total quantity of valuations to obey a conservation law prevents the prediction of a future state. Thus, following Northrop, the "lack of an adequate theory of growth or economic development [as] the most obvious need of agricultural economists. . . ." can only be a pseudo-problem.[17] Although the subcommittee remarks that "The direct quest of such a theory does not appear promising . . ." Northrop says it is "ruled out." Thus we can complete Diagram 3 by inserting the metaphysical ellipse and the presupposition that the system is in the state of constant change, i.e., its Dr. Jekyll and Mr. Hyde characteristic.

This does not imply that agricultural economists must continue to engage in an unproductive pursuit. My conception if correct demonstrates merely that this is the case within the point of view of the subcommittee. This, however, has important implications. It means considering a different point of view.

Proposed Point of View

I do not intend to provide a fully developed point of view; rather I will show an outline of one which could be followed in searching for research

[14] All quotes from: Brinegar, *et. al., op. cit.*, pp. 606-08. Emphasis mine.
[15] *Ibid.*, p. 607. The circuit (4), (5), (7) gives rise to similar difficulties.
[16] Northrop, *op. cit.*, p. 245. Notice in this regard, the crosshatched lens between *ST* and *NT* of Diagram 2. That this point is well taken see Diagram 4.
[17] Brinegar, *et. al., op. cit.*, p. 606.

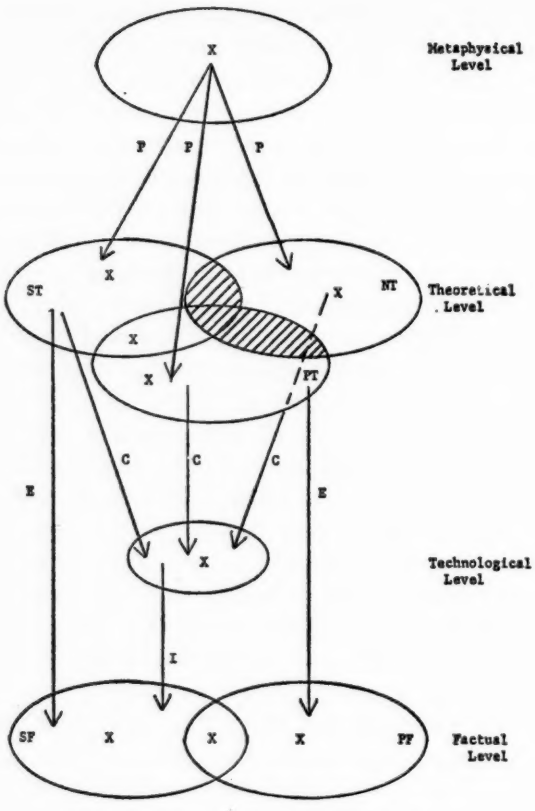


DIAGRAM 4. PROPOSED POINT OF VIEW.

problems.[18] Using Diagram 4, I will comment on four points: (1) the cross-hatched section between *ST* and *NT*, (2) the *E* relations between *ST*, *PT*, and *SF*, *PF*, (3) the technological level and (4) the metaphysical.

Cross-hatched section between ST, PT, and NT

The cross-hatched lens between *PT* and *NT* is consistent with the elimination of teleological concepts from the theories of physical science. It has been recognized by physical scientists that the "motives" or "purposes" of tornadoes, bacteria, and some higher animals are no longer of help in explaining physical facts. The cross-hatched section between *ST* and *NT* implies that purpose can be eliminated as an explanatory variable in societal theory.[19] Arguments which use ends and purposes to "ex-

[18] The argument at this stage must be abstract because it would take a book to fill in the outline. Also specific examples may be difficult to find at present.

[19] For some discussion of this point see C. West Churchman and Russell L. Ackoff's *Methods of Inquiry* (St. Louis: Educational Publishers, 1950). This is an excellent in-

plain" human behavior often appear quite convincing. However, they are just as often of an *ex post facto* character and hence lack predictive powers. Thus the worth of an explanation must be judged upon other grounds than "familiarity" (empathy).

The E relations

The *E* relations proposed between theory and fact run in one direction, i.e., the method of science is hypothetical-deductive-testable and hence induction has no place in it. The criterion of a scientific theory is its falsifiability or refutability. The method of science is one of trial and error—(1) proposing hypotheses, (2) deducing predictions, (3) attempting to refute the theory by "risking" a comparison between prediction and observable facts. This is the program proposed by the empiricists to set scientific endeavors apart from technological. Thus induction, i.e., inference based on many observations, according to K. R. Popper, is a myth.[20]

It is often lamented that social scientists in general and economists in particular lack sufficient numbers of observations to "induce" generalizations about social phenomena. If Popper is correct the actual procedure of science is to operate with conjectures, i.e. to jump to conclusions often after only one single observation. Then repeated observations can serve the useful purpose of testing the conjectures or hypotheses, i.e. as attempted refutations. I believe it would be worthwhile for us to examine critically some of our research efforts which seek only confirming evidence. Rather more of our efforts should be expended in testing our theories, i.e. in attempts to falsify them or refute them.

The technological level

That social, physical and normative theory contribute to the technology of instruments and institutions is made clear by proposing that the propositions of practical worth are of the same character, hence social institutions and technological instruments can be included in one ellipse. The methods of technology are different from science in that causal chains which link what is known of social and physical theories to what is prescribed by normative theory are desired.[21]

---

troduction to philosophy and scientific method in that it summarizes and contrasts different points of view. Also see Ernest Nagel, "Teleological Explanation and Teleological Systems," in Herbert Feigl and May Brodbeck (eds.) *Readings in the Philosophy of Science* (New York: Appleton-Century Crofts, Inc., 1953), pp. 537-58.

[20] Karl R. Popper, "Philosophy of Science: A Personal Report," in C. A. Mace (ed.), *British Philosophy in the Mid-Century* (London: George Allen and Unwin Ltd., 1957), pp. 155-91.

[21] For some discussion of this point I refer you to Stephen Toulmin's book, *The Philosophy of Science* (London: Hutchinsons University Library, 1953) and in particular the relationship between the theories of science and the practices of applied science. Also see C. Hillis Kaiser, *An Essay on Method* (New Brunswick: Rutgers Univ. Press, 1952), pp. 62-68.

The metaphysical

That something must be presupposed for science and technology is clearly pictured in the proposed view. That the methods of science cannot be applied to judging the results of science and technology is explicit from the downward direction of all the arrows. However, that some other method can evaluate the results is the intent of the presupposing relations (*P*). The examination of these metaphysical relations is the function of philosophy.[22]

Conclusions

The question—Where do problems arise and how are they identified?—now can be examined from this proposed point of view.

While each level gives rise to research problems, whether or not agriculture economists should work on them is not clear. I expect we could get an argument concerning the status of agricultural economics, i.e., is it entirely concerned with technological and applied matters or is it an empirical science concerned with the development of social theory? I personally would argue that *if* it is entirely technological then it begs the question, "From what source do we get the social theory?" If the answer is from Economics and Sociology, I would want to question their status.[23] With little difficulty, references can be found which claim that all social sciences are technological.[24] This, of course, begs the question again: From what source do we get the theory? Hence, I conclude that agricultural economists must be concerned with scientific matters of theory formulation and testing. To identify problems in this area one examines the gap between our present knowledge of tested theory and facts yet unexplained. Working problems arise from a background of established theory and the tentative hypothetical statements intended to explain the subjects of doubt.

Problems at the technological level are identified by the gap between what normative theory prescribes and what the facts show is the real situation. However, the identification and subsequent solution of problems by the technologist is hampered by the lack of social theory. Until answers are given to explanatory questions which only societal theory formulation can provide, the status of agricultural economics as technology remains shaky. Hence, the technologist must be prepared to confine himself to problems which are at best approximately solvable within the realm of existing theory. The engineer always will be limited to the extent

[22] Cf. *Ibid.*, pp. 89-116.

[23] This has been started. Cf. A. N. Halter and H. H. Jack, "Toward a Philosophy of Science for Agricultural Economic Research," *J. Farm Econ.*, Feb. 1961.

[24] Wm. Oliver Martin, *The Order and Integration of Knowledge* (Ann Arbor: Univ. Mich. Press, 1957), p. 76.

that theory is known to explain the facts. To this the critic might reply that people were building bridges long before theoretical physics was known. To which I would reply: Not only did some of the bridges collapse, as they do today, but then there wasn't an engineering association to tell us that engineers are the best equipped to solve our "bridge building" problems.

DISCUSSION: THE IDENTIFICATION OF PROBLEMS IN AGRICULTURAL ECONOMICS RESEARCH

W. B. BACK
Oklahoma State University

> Robert Hooke, scientist and astronomer who constructed the compound microscope, set down the purpose of the Royal Society as "to improve the knowledge of natural things, and all useful Arts, Manufactures, Mechanick Practices, Engines and Inventions by experiments—(not meddling with Divinity, Metaphysics, Moralls, Politicks, Grammar, Rhetoric or Logick)." *The New York Times,* July 31, 1960.

Halter has developed a classification useful in describing methodological viewpoints of science, but of little value for identifying problems in agricultural economics research. In discussing his paper, I consider it necessary to defend the philosophy of Northrop, the views expressed by the subcommittee of the Social Science Research Council Committee on Agricultural Economics, hereafter called the subcommittee, and economics.

The subcommittee recommended: "A . . . careful study of agricultural economics . . . by agricultural economists. . . . An analysis of the intellectual efforts of agricultural economists . . . in the frame of reference of F. S. C. Northrop, *The Logic of the Sciences and the Humanities.*"[1] Halter's paper could be interpreted as an effort to contribute to this objective, except he chose not to develop his analysis in the frame of reference of F. S. C. Northrop. Furthermore, the parts of his paper dealing with ideas of Northrop indicate he and I have a different understanding of this frame of reference. What is the frame of reference of Northrop?

I believe the main characteristic of Northrop's frame of reference is a philosophical method for resolving ideological conflicts underlying problems of value within or among societies or problems of method in the sciences. I interpret his method to be about as follows: (1) analyze the ideologies or viewpoints to designate the basic theoretical assumptions from which they proceed, (2) specify a common, single set of assumptions

[1] Brinegar, et al., "Reorientations in Research in Agricultural Economics," *J. Farm Econ.*, 41:618 (Aug. 1959).

possessing greater generality than any underlying the individual ideologies but which permit retaining the largest possible number of logically compatible assumptions of those individual viewpoints, and (3) reconstruct the assumptions of individual viewpoints to the extent necessary to bring them into accord with the nature of things as revealed by philosophical and scientific knowledge.

I conclude from Northrop's application of his method in a study of the sciences that (1) the advocated methods of science are not necessarily in conflict, but each has a place that depends upon the problem at hand, the stage of the research process, and the nature of, or the state of maturity of the science, and (2) there is not one scientific method, but several, and each of the advocated methods is insufficient as a general methodology of science. Northrop's statement on the logic of the sciences and the humanities, or his frame of reference, is his interpretation of the methodologies thereof, *de facto,* and his perception of a single philosophy encompassing all these viewpoints. Thus, Northrop's frame of reference is not necessarily a fixed methodological viewpoint of science.

Science and research, he asserts, begin with specific problems, not with facts, hypotheses or a method.[2] Thus, the appropriate methodological viewpoint for a science depends upon its problems according to Northrop. Halter's paper implied the reverse, that is, problems depend upon viewpoint. Thus, Halter has attempted a search for a methodological viewpoint for agricultural economics without considering its subject matter and problems.

For a science in an advanced state of maturity, such as physics, a methodology mainly deductive in character may be employed because the foundations or postulates thereof permit deductions with a high degree of precision in prediction. However, these foundations were built by such individuals as Galileo, Newton and Einstein, and the building process was mainly inductive rather than deductive in method.[3] On the other hand, for a science with problems of a high degree of inaccuracy in its predictions, the foundations for a deductive science are inadequate, and much reliance on methods mainly inductive may be appropriate. This is not to imply that a research process can be exclusively inductive. Pre-

---

[2] *Logic of the Sciences and the Humanities,* p. 255.

[3] My conception of induction and deduction was derived from Cohen and Nagel, *Introduction to Logic and the Scientific Method.* The distinction they make is as follows: ". . . while induction and deduction are not opposed as forms of inference, nevertheless deduction is not concerned with the truth or falsity of its premises, while the characteristic nature of induction is to be concerned with just that. Induction may therefore be viewed as the method by means of which the material truth of the premises is established. The proper contrast is not between deductive and inductive inference, but between inferences that are necessary and inferences that are probable." (Pp. 278-79).

suppositions are necessary. However, a research process mainly inductive permits subjecting any preconceptions to scrutiny as a part of that process. The reconstruction of preconceptions, if such is necessary to obtain the desired degree of realism, is a part of the first stage in research, the intellectual process of problem analysis.

Induction is an essential part of the process of constructing models or hypotheses for specific problem situations. Also, the practice of making inferences of methodological viewpoints of scientists from a selected sample of their statements, as Halter did in his paper, is induction. Thus, I am unable to understand why Halter excluded induction in his proposed viewpoint for agricultural economists. I believe that our effort to exclude or to minimize induction in our research analyses is to the detriment of our analyses.

Although induction is necessary for using Halter's classification for depicting the viewpoints of scientists, much risk is involved in this procedure. I shall cite two examples. First, Halter inferred that Northrop believed social theory could be constructed without reference to the existing ends or values of people. Yet, I find on page 257 of his book the following statement:

> . . . factual social theory can include norms in its subject matter. A factual social theory of contemporary Russia would have to refer to its communist ideology. This, however, does not make the factual social theory normative. . . . Hence, by the method for determining normative social theory is not meant a method enabling one to include norms among its factual data as a factual sociological theory can and probably must do. . . .

Second, Halter inferred from statements of the subcommittee that they believed theory springs from facts by induction. I have studied the statements of the subcommittee, including those quoted by Halter, and I am unable to reach this conclusion. In fact, I am unable to arrive at any defensible inferences on what the members of the subcommittee believe about the way theory is constructed. Perhaps Halter has greater powers of induction than I possess.

I shall turn now to my major criticism of Halter's paper—his proposed viewpoint denying that existing ends of people are necessary for describing and explaining human conduct. He based this aspect of his proposed viewpoint upon an identification of a pseudo problem contained in the depicted viewpoint said to be that of the subcommittee and upon statements by such philosophers as Churchman and Ackoff.

By Halter's standards, the questions raised by the subcommittee in their published article lack meaning because the answers depend upon success in constructing a theory of economic development, and it is impossible to construct such a theory. I could agree with Halter if our standards for a theory are deterministic, i.e., any fact or consequence predicted

inconsistent with a theory refutes it. However I do not believe such determinism is appropriate in economics, or even possible in dynamic economics. Rather, I believe there are limits short of certainty as degrees of precision possible in our predictions. Furthermore, I believe we are far short of these limits in the subject matter of economic development, and progress can be made by research on the questions raised by the subcommittee.

It seems to me that Halter, in attempting to escape the pseudo problem he says the subcommittee faces, has placed himself in an impossible position. His viewpoint is incompatible with economics. Economics pertains to human conduct under conditions of scarcity. Where there is scarcity, there is value. I doubt that there can be a purely mechanical theory of human conduct which will explain any facts in economic behavior. I do not believe purpose can be omitted as a contributing element in activities of rational people. The essence of rationality is consistency in pursuit of purpose. There must be criteria for decisions by people under conditions of scarcity. In fact, Halter has unwittingly conceded the importance of values in explaining behavior when he says that "One of the main incentives for research is the desire to win the esteem of one's associates."

It seems logical to conclude that Halter's proposed viewpoint, because it excludes positive questions about values, also excludes the normative questions, "What ought to be." Perhaps he relegates both positive and normative questions about values to philosophers. This, it seems to me, means relinquishing to philosophers the subject matter and problems of economics. I submit that our ideological conflicts in methodology are not different, in principle, from ideological conflicts underlying problems of value in our society. Halter was willing to assert "What ought to be" in methodology, and I believe he would claim to be a social scientist instead of a philosopher. So why does he exclude questions pertaining to value as problems for other social scientists?

Any recommendation of a viewpoint of science presupposes an ideology, and it may be best that an analysis in the frame of reference of F. S. C. Northrop precede our recommendations on methodology. The ideology underlying Halter's proposed viewpoint is that of some philosophers, and, in my opinion, it is inadequate for economists or agricultural economists.

ARE AGRICULTURAL ECONOMISTS BECOMING MECHANICS?

HOWARD E. CONKLIN
Cornell University

I WILL CLAIM this morning that agricultural economists are not *becoming* mechanics; that instead they have been mechanics for a long time, along with their fellow workers in other branches of economics; that, in fact, they are showing some signs of becoming rather less mechanically minded at present.

My thesis will be that men are important in the phenomena with which we deal, that patterns of thought in economics have abstracted from flesh and blood men, that these abstractions have been made because we have idolized Newtonian mechanical concepts as the acme of science, and that the Newtonian mechanical image is as unrealistic in our area as in the quantum area.

I have spent a little time in foreign work. An assignment in one of the underdeveloped areas of the world can sober an economist better than any treatment I know. Faced with a concrete problem outside of the context we have been able to assume at home, we often feel frustrated and impotent. I have been in areas where I was sure U.S. men and U.S. culture could quickly build a highly productive and prosperous economy, yet felt discouraged and lost when I faced the job I was to do—help the few there who had this same vision start a movement toward its realization, beginning with their people and their culture as they stand today. I have been on many farms in these countries for which I could have set up realistic budgets of profitable businesses, programmed an efficient organization, or even taken over the operation personally and increased its productivity and earning power many fold. But then I looked at the man who actually had to do the job if it were to be done, and at the title he held to his land, the dealers with whom he had to do business, his sources of credit, his sources of technical knowledge, the roads and other public services, and the slim chance he had to influence by vote or otherwise the rules of the game under which he operates and lives. I could only conclude that some kind of revolution was needed. The next thing I knew my chauffeur was speaking hopefully of the *next* revolution and the possibility that he might get a soft job *next* time, instead of having to drive cars for a living (he could have added, "to transport foreigners"). I knew then that the term "revolution" does not denote a very specific or useful concept.

But what concepts do we have by which we can denote the kinds of changes that in the real world constitute the process of *economic* development? Can we find any of these concepts within the territory we claim

as economists? Particularly, can we find concepts that cover the changes that must take place in men's minds before they are willing and able to create the kinds of changes in land titles, market institutions, credit sources, and the like, that are needed? Economic systems are run by men. It does little good to outline a mechanically ideal form of organization if the people do not understand it, can not operate it, do not yet want the things it will produce bad enough to give up the things it will not produce, cannot or will not establish the kinds of inter-personal and inter-class relationships that are consistent with it, or, out of a false pride, simply refuse to accept something that came from a foreign source.

When we return from a foreign assignment to re-examine our field, some of us begin to wonder, could it be that for two hundred years economists in these countries have been carried along on a tide that is not of their own making, but with origins so obscure that they could claim its parentage? Do we have a real grasp of why things happen as they do in our economic world—why one industry flourishes and another does not; why technological improvements come in one field and not another; why we have prosperity and recession; why farmers in the South only recently discovered they can produce eggs cheaper than farmers in the Northeast; why the United States has increased productivity so fast and whether Russia will move ahead as fast or faster in the future? To be sure, we have some answers to these questions—people want one thing and not another, accidents of scientific progress, relative rates of investment and consumption, education, and so forth. But the fact remains that many of us forecast depression and not prosperity on the farm after the war, were caught unprepared when farmers started asking about pipeline milkers, were in no better position when the bottom fell out of the price of eggs, and really would make a bad showing in any discussion of Russia's probable future productivity levels in agriculture even if we knew all the physical and biological constants that characterize her resources.

Recent contact with situations where the limitations of men's minds are so critical lead us to believe that surely flesh and blood men, not man as a colorless abstraction, built the progress we have known. Yet when we look for men in the great structure of economic thought built by us in our highly developed societies we find only the scantiest and haziest of notions—assumptions that all men seek only money income, that all have or can instantly acquire any skill, that all have a complete knowledge of the facts of the world, that all are rational according to some system of logic, and that all have a declining desire for specific commodities as they get more of them. We do not find specific assumptions with respect to the large array of the dimensions of men that we felt surely were important back in underdeveloped country *X*, nor do we find the frequency distributions by which it seems necessary to describe the dimensions of a

group of men. We find that the greatest stir of modern times in economics was created by a man who introduced two dimensions of man—really two modifications of old dimensions—the propensity to consume (or save) and *estimates* of the marginal efficiency of capital. But even these are taken to be dimensions of an undifferentiated mass of men, with no frequency distributions. It is true, of course, that on the fuzzy edges of the field we have welfare and institutional economists, but even these, though more humanistic, do not speak very explicitly in terms of the characteristics and behavior patterns of the atoms in our universe—men. Nor would we point with great pride to the accomplishments of these men if we were engaged in presenting a case for the inclusion of economists in the exalted fraternity of "true" scientists.

If you were in an argument with a Martian over the scientific accomplishments of your respective cultures, which of the world sciences would you cite as the greatest? Ten to one it would be physics. Suppose such an argument had developed at any time over the past two hundred years; ten to one you would have cited physics. Why does my oldest boy, now in high school, look at me as though I were a little childish when I try to point out that I am really a scientist? After all, his teacher has never mentioned economics when discussing the sciences of the world. Yet we so desperately would like to be considered scientists!

The dominance of physics, combined with our desire to be considered scientists, has led us in strange ways. Like step-children seeking acceptance, we have copied those who were accepted.

Physicists for some two hundred years made great strides with a deterministic mechanical image of the universe. Newton set their feet firmly on this path with a well defined set of concepts—force, mass, velocity, and their derivatives—and his famous laws of motion and gravitation. Physicists then embarked upon a great effort to find the set of invariant relationships that would describe completely the universe (including by implication man).

Many economists trace their intellectual lineage to Adam Smith. Smith wrote when Newtonian physics was developing rapidly but before it had attained the supremacy it finally reached. It is only by searching that one can find in *Wealth of Nations* pieces of the mechanical skeleton, that later was abstracted, elaborated, and fastened on as the "science" of economics. Malthus' efforts to keep man in the picture were cast aside not many years later and economics bowed before the image of a world describable in single-valued functions after the mechanical pattern of physics. The marginal (rate of change) concept was absorbed from Newton's calculus and economists brought forward what is still considered their great contribution, marginal analysis and the maximizing process. Holding this aloft they have demanded entry to the scientific fraternity.

"See, are not ours the methods of true scientists?" Of course they are! They were borrowed lock, stock and barrel. One suspects that the "true" scientists have seen through this maneuver.

Or, perhaps, the physicists have read Lionel Robbins' *The Nature and Significance of Economic Science,* wherein he makes it clear that a mechanical image does not fit the world of economic reality because in this world "there is no reason to suppose that uniformities are to be discovered." Physicists of the past doubtless would not have recognized the limitations of the image, but surely they would not have sympathized with Robbins' retreat into the imaginary, even though he had to make this retreat to preserve the image.

Professor Boulding in his recent book *The Skills of the Economist* emphasizes the nonhuman character of economics and, by implication, the persisting predilection of economists for the mechanical. In the early part of his book, where he is leading his colleagues out onto a limb, he defines economics as the study of the behavior of commodities. Surely this is economics after a mechanical pattern. Later Boulding removes the limb with a saw that he forges from observations that the behavior of men, even if predictable only in a probability sense, are still somehow important to the events of the economic world.

It seems that economists in the past principally have engaged in two activities. They have constructed and read devices that record the consequences of human action in the economic area, much like physicists constructed and read thermometers for many years without exploring the phenomena that lie behind the readings. And they have speculated about what the economic world would be like if it were constructed along deterministic mechanical lines and operated without interference by men. They have not tried to derive explanations at the level of individual men, and in terms of frequency distributions of groups thereof, for the economic phenomena of the real world. They have shrunk from the latter because they knew that in this effort they could find no invariant relationships and because they felt that nothing could be scientific unless it produced invariant "laws."

It begins to appear now, however, that if the economists will continue to hold to the physicist's apron strings they soon can borrow an image that will serve their purposes better. Conceptually the physicists have been going through a major crisis. Having proclaimed to the world, and to themselves, for two hundred years the idea that nothing can be really scientific unless it can be reduced to single-valued functions, and after this idea was accepted as a creed that transcends all creeds, the physicists have had to admit they were wrong. They had to repudiate this idea to make further progress in their own area. Previously they had to patch and twist their mechanical model to make it fit electricity and

magnetism, but they were able to retain intact the notion that single-valued functions are the true goals of science. But when they turned to the study of atomic disintegration, and then to artificial atomic destruction, they finally reached a point where their deterministic conceptions had to give way. They have had to recognize fundamental uncertainties in the interaction between a stream of sub-atomic "particles" and larger aggregates of matter, and have had to admit that phenomena in this area must be treated by the use of frequency distributions and probability functions. They have gone so far, in fact, as to formulate a principle, the Heisenberg uncertainty principle, which maintains that man will not be able even in principle to escape from the need for using probability functions in treating these phenomena.

Physicists now are proclaiming that models should be looked on as *policies* and never as creeds. They have, indeed, a second reason for insistence on this new point of view, closely related to the atomic problems they have had, but distinct for our purposes. They are currently finding it necessary to use two images of light simultaneously, a wave theory for transmission and a corpuscular theory for emission and reception. In the face of this they scarcely could hold models as else but policies!

These changes in physics are being hailed as the greatest revolution the world has ever known. Those who are hailing them as so great are within physics. I have a strong feeling that they do not know half the story. Since physicists seem to write the Book in the gospel we call science, since so many important sciences deal with life processes and living things, since clearly there are all sorts of uncertainties where life enters, this new point of view in physics may indeed bring a revolution. The Heisenberg uncertainty principle may go down as the most critical turning point in many generations of the total scientific effort of man. It can free students of biological and social phenomena from the overpowering pressure that has forced their thinking into the deterministic mold.

In economics we may now be able to recognize men as individuals in a meaningful universe—men with all of their physical and mental variability and men with volition and purpose. Perhaps now we can in a forthright manner set about the task of measuring the relevant dimensions of men, building up theories and knowledge about their frequency distributions in terms of these dimensions, postulating the kinds of probability functions that realistically represent relationships within the processes of human action and interaction in the economic area, then testing these ideas in continua of inquiry for which the end points have been modeled to fit a probability image. And perhaps we can do this without feeling that we are heretics, outcasts, or traitors to the cause of true science.

Illustrations of the acceptance of a deterministic mechanical image are plentiful within agricultural economics. So are the problems one encounters with this image. Certainly if we were to argue that we should be included within the scientific fraternity we would point to the "maximizing" work we have done in farm management research. The ideas behind this research, whether it be done by budgeting, correlation, linear programming, or any other technique, and whether it be based on survey data, case records, or data from production specialists, provide a good illustration of the application of the mechanical model. The fact that we have gotten stuck at this maximizing level provides a good illustration of the completeness of our acceptance of this model, and the results are an illustration of its limitations. In this work we brush man aside by saying, "If you want to know how to maximize income, we will show you. But if you are interested in something short of maximum, are worried about the problem of acquiring the skills needed to do what we suggest, have problems of capital or labor acquisition, or are concerned with weighing the opportunities in farming against those in another occupation, those are your problems." To be sure, we use the concepts of calculus and we can use the beautiful notation of mathematics. But after all our years of effort we still argue about whether farmers would produce more or less corn if the price of corn were reduced! In order to keep our procedure "clean," after the mechanical pattern, we do not even build into our analytical process known facts with respect to biological and weather variability. If we did, our answers would need to be qualified by probabilities and this would be messy and "unscientific." We may talk about risk as a function of climatic, biological, or even possibly human variability, but we add this as an afterthought and do not brag about it when we are trying to parade as scientists. On the human side also, we usually ignore factors that determine how our recommendations will be received. This despite the fact that even if our interest were focused exclusively on improving resource use and incomes, we must work through farmers as intermediaries in the process of improvement.

Partly because the promotion of recommendations is an educational process that takes time, and partly because our institutional arrangements involve equity ratios and degrees of confidence, the job of building a successful business takes time. In no event can non-human maximizing methods give more than goals to be sought over a period of years. It also often is important that the steps in growth be taken in a certain sequence. This is true not only because the marginal productivities of the various steps differ, but because men and institutions are involved in the process. Our farm management methods of analysis might be called static against this background. I would call them infinitely dynamic instead. They are ill-suited not because they fail to consider change. Their limitations come

from ignoring men and the finite velocities with which men change.

Some claim that the job of tailoring recommendations to men and institutions is the job of extension personnel. This is the way, of course, in which we have avoided facing up to the limitations of the image of the world we have been using. Anything that does not fit the deterministic mechanical mold is pushed off into extension, or policy, or some other fuzzy area where the workers do not have exalted scientific ambitions.

Our mechanical image does not even fit the processes by which we collect our data. We not only over-emphasize averages, regression lines, and coefficients in order to abstract from risk and human elements, but we submerge as fully as possible the uncertainties inherent in the stochastic process of sampling. Instead of facing up to the fact that truth in this situation must be taken as the limit stochastically approached by a continuum of inquiry, we have let ourselves slip often into the habit of thinking as though the devices of inferential statistics could establish in some final sense the truth of what has been revealed to us in our one and only sample. And it should be no comfort to point to the fact that biometricians err more in this than we. We frequently use the results they have gotten on but one field of the thousands in our universe as though their tests of significance establish truth as definitively as they imply.

The attempts that have been made to explain the market for agricultural real estate present another example of thinking in the mechanical pattern; one that has been refined and restated but not changed in fundamental nature since the time of David Ricardo. The theory on this point is very "clean-cut." It can be presented in words, numbers, charts, or concise mathematical notation. It has the appearance of a true law in the traditional scientific sense. But it attains its clean-cut character by making men mechanical automatons with but one goal and complete knowledge and by neglecting the most elementary aspects of our credit institutions. And it reaches the unrealistic conclusion that all land will be priced so that it is within the power of any man to make as high an income on any grade of it as on any other. Most of us are well aware that this conclusion is unrealistic, but this is our "core" theory and we feel obliged to teach it before we start talking about the "distortions" of the real world. And we consider that if there is any science in what we teach, this is it.

Postulate some time a frequency distribution of men with respect to the degree of their knowledge of the variability that exists in the performance characteristics of land. Add another frequency distribution of men in terms of their command over capital under existing institutional arrangements. Substitute these for the corresponding assumptions in our traditional theory of land valuation and farming returns and notice how

these simple changes modify the conclusions. It is indeed surprising that we, as social scientists, have recognized variability in physical objects such as land but have so steadfastly refused to recognize variability in men and in the positions of men relative to one another.

We need economic theories that can explain real economic phenomena; theories that are more than notions of what the economic world would be like if it were a non-human machine. We need such theories for prediction—"disinterested" prediction, or prediction of consequences for efforts to apply "guidance" to economic processes. Men with all their variability in space and time must occupy an important position in such theories. Our starting points must not be simply production functions, cost curves, and demand schedules; nor even such aggregates as the propensity to consume. They must include frequency distributions of men on an increasing array of the dimensions of man that determine his wants and his ability and willingness to produce. We must learn to live with probability as an integral part of our thinking and we must build into our framework a conception of truth as the stochastic limit of an infinitely long continuum of inquiry. Thanks to Heisenberg and his colleagues, we need no longer cringe in fear that the gods of science will smite us merely because we see as our goal something beside deterministic, single-valued laws derivable, in principle, immediately.

I have real hope that agricultural economists can play a major part in building the kind of economic theory that is needed. The institutional framework within which we operate forces most of us to concern ourselves with the "practical" affairs of at least one segment of economic activity. While our formal theories are often copies of theory from general economics, we do have a large body of what in the past we would have called at best semi-scientific knowledge about men and institutions. We have accumulated this knowledge to answer immediate problems, such as those concerned with support prices, technological displacement of men and land, and the merchandizing of agricultural products. This knowledge needs to be organized and extended, but now we can go about the job of organization and the tasks of studying decision making by men, consumer reactions to merchandizing techniques, the effects of alternative institutional arrangements, and a wide array of related subjects, in the name of Science.*

* Many extended footnote references could have been made in the body of this discussion. It is clear that the ideas presented came from many sources. Many of them came from one or more of the following:

Boulding, K. E., *The Skills of the Economist,* Howard Allen, Inc., Cleveland, 1958.
Braithwaite, R. B., *Scientific Explanation,* Harper & Brothers, New York, 1953.
Bridgeman, P. W., *The Logic of Modern Physics,* Macmillan Company, New York, 1927.

DISCUSSION: ARE AGRICULTURAL ECONOMISTS BECOMING MECHANICS?

EARL R. SWANSON
University of Illinois

Professor Conklin tells us that agricultural economists have been mechanics for a long time in the sense of following the lead of Newtonian physics. He points out that this conceptual apparatus is inadequate in terms of, among other things, the "kinds of changes that in the real world constitute the process of *economic* development." He expresses disappointment that "flesh and blood men" cannot be found in the structure of economic thought as it has developed over the last two hundred years. He imputes to agricultural economists a great desire to be considered scientists. This, coupled with the dominating influence of physics in the arena of science, has led economists into the use of inappropriate concepts and methods.

Professor Conklin charges that economists "have not tried to derive explanations at the level of individual men, and in terms of frequency distributions of groups thereof, for the economic phenomena of the real world." But all is not lost; with the advent of the Heisenberg uncertainty principle in physics, we can free ourselves from the pressure of using a mechanical image, and we may proceed with our activities with renewed hope of acceptance into full membership in the scientific fraternity.

In discussing this paper I should like to make the following points:

1. There is an omitted aspect of the transition from the Newtonian system to present-day physics that may be more important than dropping the view of single-valued functions which Professor Conklin emphasizes.

2. We have reason to be optimistic about the progress of our profession, but not principally because we will try to derive status by following the ideas and methods of contemporary physics.

Newton suggested that he used no hypotheses and that he deduced his

---

Churchman, C. W., *Theory of Experimental Inference*, Macmillan Company, New York, 1948.

Conant, J. B., *Modern Science and Modern Man*, Doubleday & Company, Garden City, New York, 1954.

Hutchison, T. W., *The Significance and Basic Postulates of Economic Theory*, Macmillan Company, New York, 1938.

Hutten, E. H., *The Language of Modern Physics*, Macmillan Company, New York, 1956.

Pledge, H. T., *Science Since 1500*, H. M. Stationery Office, London, 1939.

Robbins, Lionel, *The Nature and Significance of Economic Science*, Macmillan Company, London, 1935.

Von Mises, Richard, *Probability, Statistics and Truth*, George Allen and Unwin, London, 1957.

fundamental laws from experimental data. If this conception of the relation between observations and theory had been adequate, Newton's theory would never have required modification. However, later experiments were performed yielding evidence that could not exist within the Newtonian system. The point to be made here is that there was a shift in viewpoint to that of arriving at theory by speculative means and having the deduction in the method run from the assumed theory to the observations instead of vice versa. Under this later view any theory is tentative and subject to further modification with the advent of incompatible evidence. I suggest that this change in thinking is more important for us than the abandonment of single-valued functions.

This reorientation in viewpoint concerning the role of theory is, of course, a debatable one. When it comes to the relationship between theory and observations, Professor Conklin raises doubt, at least in my mind, because he seems to cling to the Newtonian tradition which he has rejected on other grounds. He says, "We need economic theories that can explain real economic phenomena. . . . Our starting points . . . must include frequency distributions of men on an increasing array of the dimensions of man." I am not certain whether the "frequency distributions of men" which he has in mind as a "starting point" refer to empirical observations, theoretical constructs, or both.

In passing we should note that probability did play a role in Newton's mechanics. It was restricted, however, to the relation of the scientist to the *verification* of what he knows and not explicitly in the *theoretical statement* of what he knows. I must confess that I am not always clear about the sense in which probability is used by Professor Conklin. For example, he hints that he may have both in mind: "We must learn to live with probability as an integral part of our thinking and we must build into our framework a conception of truth as the stochastic limit of an infinitely long continuum of inquiry."

In terms of the integration of probabilistic notions into the theoretical structure of economics, I believe that his paper overemphasizes the tardiness of this development in relation to developments in physics. I would not pretend to select the earliest significant contribution of this nature, but one must recognize Frank Knight's classic work[1] as one influential in terms of modification of economic theory in the last 40 years to accommodate aspects of uncertainty. It is certainly true that the present state of affairs is far from satisfactory, but that is another matter.

There is another point to be mentioned in connection with quantum theory. This is essentially an extension of what Professor Conklin has already said. When one considers the smallest building stones of matter in

[1] Knight, Frank H., *Risk, Uncertainty and Profit*, Houghton Mifflin Company, 1921.

the contemporary view, the physical process of observation itself produces a disturbance in the materials studied. Thus behavior is no longer independent of observation and the laws formulated mathematically in quantum theory no longer deal with the particles themselves but with the physicists' knowledge of them. The interaction between the interviewer and the interviewee has long been known to be an important factor affecting the nature of observations in the social sciences.

Turning now to my second point, and again it is a matter of relative emphasis, I am inclined to believe that Professor Conklin makes too much of an issue of our desire to become scientists in terms of the popular view of what constitutes scientific endeavor. I wish I knew how serious he is when he remarks that since Heisenberg we can go about our work of organizing and extending our knowledge in the name of science.

We have reason to be optimistic, but not because of any apparent influence of the mentioned development in physics. If we must seek the status of a science we need to make clear that the standard of objectivity should be the criterion and not conformity to a requirement of exactitude. The distinction between the fields of activity characterized by precise terms, exact derivations and reliable predictions and those having vague terms, intuitive insights and poor records of predictability should not be equated to mean the same as "scientific" or "unscientific." Even in certain branches of physics, such as aerodynamics and the physics of extreme temperatures and also the more applied fields of physics (engineering), only very restricted generalizations can be made. Explanation of phenomena in these areas, as well as in economics, is likely to take the form of less-than-universal principles. For prediction (as contrasted to explanation) other methods may need to be employed. Expert opinion may appropriately be used to make a decision in which the methods employed by the expert are less sophisticated and systematic than that used to explain the phenomenon under consideration. Further, expert opinion may be useful in furnishing insights for hypothesis formulation. It is tempting to speculate on the future of the relative emphasis within our profession of the role of the informal predicting expert who uses judgment, intuition and wisdom and that of the researcher methodically seeking to explain phenomena. Interesting questions of the role of each in our profession would, of course, lead to consideration of the proper institutional "home" for each. But this would lead us even further astray from the topic.

The options that we have in choosing the instrumentalities of prediction, as apart from our explanatory activities, offer an inviting area for innovation that is not open to those in the exact sciences. For example, one could hardly argue (and this comes to mind especially in an election year) that there is not a great need for study of the optimum utilization of expertise in pragmatic policy decision making. This problem might be

investigated by a variety of methods, which retain the criterion of objectivity. The success of the past predictive activity of experts can, at least in principle, be made a part of the theory, and the particular judgments given by an expert can be regarded as the data in the scheme. In combining the valuations of many experts, several schemes have been suggested.[2] There is also opportunity for agricultural economists in borrowing from other inexact sciences such techniques, for example, as simulation for use in the usual instances which we encounter in which true experimentation is, for various reasons, not possible.[3] The biological sciences may also furnish us some additional insights in developing models. Boulding[4] states than when he refers to society as an ecological system, he is not merely using an analogy but that society is an example of the concept of an ecosystem, and that biological systems are other examples.

Although we may feel a certain relief in the increase in flexibility gained by the shift away from a mechanical model in physics, we would do well also to be alert to developments in other areas, in particular those in the inexact sciences. We can do so, I submit, (if this is really important) in the name of science.

---

[2] A. Kaplan, et. al., "The Prediction of Social and Technological Events," *Public Opinion Quar.*, Spring 1950.

[3] A. M. Mood and R. D. Specht, "Gaming As A Technique of Analysis," Rand Corp. Paper P-579, 1954.

[4] Kenneth E. Boulding, *A Reconstruction of Economics*, New York, John Wiley and Sons, 1950, p. 6.

CONTRIBUTED PAPERS: TEACHING AGRICULTURAL ECONOMICS*

CHAIRMAN: LAWRENCE A. BRADFORD, UNIVERSITY OF KENTUCKY

REORIENTING THE TRAINING OF AGRICULTURAL ECONOMISTS IN CONFORMITY WITH CHANGING RESEARCH NEEDS

ALAN R. BIRD
Michigan State University

A SUBCOMMITTEE of the Social Science Research Council recently claimed that many critical economic problems confronting agriculture are not divisible into traditional "thought compartments." This committee accordingly suggested the need for bursting traditional bonds in order to achieve more creative approaches. As a partial sequel, this paper explores the need for a further consideration by agricultural economists of one such thought compartment, *viz,* sociology, including rural sociology. Some likely reasons for the virtual lack of explicit attention to sociology by agricultural economists are suggested. Modifications of the training of agricultural economists which would help most to remedy this deficiency are then hypothesized.

We submit that there are important enough problems of likely concern to both the agricultural economist and the sociologist to warrant closer collaboration. As an example, the study of the relationship of U.S. agriculture (including "commercial" agriculture) to economic growth and stability appears to involve important problems of likely profitable joint concern.

We suggest that the main reasons for the slight explicit reference to sociology by agricultural economists are associated with personal deficiencies in background which might (1) handicap communication between different kinds of scientists or (2) retard the development of mutual understanding and respect.

As far as can be judged in AFEA 1956 Handbook, almost no agricultural economists are trained in sociology. This Handbook lists some 1,800 members (excluding institutions) within the U.S. and some few hundred foreign members. Only 12 of all U.S. members list rural sociology as their major field. Of those listing another major field, almost none gave even second preference to rural sociology and only 64 times out of a total of 3,328 second, third, and fourth preferences listed, or less than 2 percent,

* These Contributed Papers are published here in abstract only. The papers in full, or additional information regarding the studies reported, may be obtained from the authors upon request.

was rural sociology listed as a field at all. None of the major fields of interest currently lised by agricultural economists had any significant degree of associated representation of sociology.

Only 4 of the 14 AFEA members listing rural sociology as their major field are less than 50. None of these 14 listed an article in the *Journal* among his most significant publications.

Moreover, the lack of explicit attention to sociology by agricultural economists cannot reasonably be attributed to inadequate opportunities to meet each other and talk over mutual problems. In 1959, 17 states had Land-Grant institutions in which agricultural economists and rural sociologists were located in the same department (and these 17 included at least 6 which grant Ph.D's in agricultural economics), 16 had a separate department of rural sociology located on the same campus, and the remaining 17 had no such separate department of sociology or rural sociology.

We suggest, therefore, that agricultural economists do not have enough formal training in sociology. This deficiency in formal training could be one factor contributing to the lack of explicit reference to sociology by agricultural economists because either common languages, or mutual respect, or both, are insufficiently developed.

We then suggest the need to encourage several would-be agricultural economists at a few schools to adopt sociology as a field of study without diluting the quality of their training in economics. Since there are few publications readily available to agricultural economists which involve an approach to agricultural problems integrating economics and sociology, the premium on stimulation of students through active debate will be so much greater.

In this paper, sociology (including rural sociology) has been used as a fairly extreme example of a thought compartment almost neglected by agricultural economists. The suggested reorientation of training of agricultural economists with respect to sociology could very likely be suggested with equal force with respect to a number of other study areas or thought compartments.

FOUNDATION AND FASHIONS IN FARM MANAGEMENT TEACHING

A. B. LEWIS
The Council on Economic and Cultural Affairs, Inc.

IT APPEARS that a diminishing number of teachers in a diminishing number of colleges of agriculture are now teaching students those principles of Farm Management as a science which were derived from the systematic study of farms and which have proven to be applicable to

farms wherever they are found. Instead, teachers of Farm Management now represent to students as principles of the science certain concepts of abstract, "a priori" Economic Theory, presumed to be applicable to the farm as a business, or "firm." With the coming into fashion of this new view of Farm Management, teachers lay increasing stress on the fitting of higher mathematical equations to farm business data, a process in which the aid of electronic computers is frequently needed.

This development makes the teaching of Farm Management less and less suited to the needs of students from technically less advanced nations, who need to learn how to advise extension workers and peasant farmers on the management of small farms (typically 2 to 10 acres). The terminology of this type of analysis cannot be made understandable to a peasant farmer, nor will the electronic machinery be readily available to the farm management economist in his home country. A more serious matter is that most students from technically less advanced nations are already far too theoretical, and therefore far too arbitrary, in their view of farms and farmers; and a Farm Management viewpoint which treats the farm as an abstraction further reinforces this tendency. It encourages agricultural economists to ignore reality, and to seek blanket solutions to problems by purely mathematical means—solutions which may then be put into effect against both man and nature as a part of some centrally directed utopia.

This writer, furthermore, doubts the validity of the new viewpoint of Farm Management principles, even as applied to American farms, and suggests that it is based on a superficial, short-term, and basically erroneous view of the differing functions of land, labor, capital, and currently consumed materials in the production and distribution of farm income. He thinks that the foundations of Farm Management as a science which treats of the farm as first of all a geographic fact and a definite part of the earth, are valid. He suggests that there is much building still to be done on these foundations, and that more thought needs to be given to basic concepts than to statistical methods.

DESIGNING THE AGRICULTURAL BUSINESS CURRICULUM

LESTER V. MANDERSCHEID
Michigan State University

IN RECENT years many universities have developed curriculums in Agricultural Business designed to train people for positions in businesses related to agriculture. Looking at the diversity of programs under this title raises serious doubts that we, as a profession, have clarified our thoughts regarding the purpose and content of the training offered under the title.

There are at least three areas of choice which must be considered in curriculum planning. One area involves choosing the proportion of professional training as contrasted to general education. A second involves choosing between courses which emphasize principles and those which emphasize applications. The third decision area involves subject matter choices within the professional field: Does the student emphasize business or agriculture or a balance between the two?

In choosing among the alternatives we must keep in mind several considerations including: (1) the purpose of a university education, (2) the desires of those employing the graduate, (3) the desires of those who will enroll in the program, and (4) the restrictions imposed by our institutions.

Since the purpose of a university education is the development of the total man it is essential that we devote at least one-half of the total program to this general education. General education does not imply liberal arts alone; rather, it means developing the student's appreciation of the various disciplines and his role as a citizen. Two recent studies of higher education in business[1] stress the need for developing a broad background in social science and communications prior to beginning professional training.

The Agricultural Business student needs a professional education not only in business but also in scientific agriculture. There is little evidence on which to base the choice of relative emphasis on these two areas. It would appear, however, that a balanced program is needed; one which provides the student with a basic understanding of scientific agriculture and also a core program in business.

A balanced professional program in business and agriculture should develop those skills which contribute to the four basic skills for business competence[2]: (1) problem solving, (2) organizational, (3) interpersonal relations, and (4) communications. Problem solving skill involves understanding uncertainty and the process of change which generates problems and the basic principles of decision making which serve as the basis for solving problems. Organizational skill is developed through training in the principles of administration—learning the strengths and weaknesses of various organizational structures until an understanding of how to combine units for a particular purpose or set of purposes emerges. Training in behavioral science in the general education component can serve as background for this area. Understanding human behavior is also basic to the handling of interpersonal relations. The ability to exercise leadership is an elusive quality—it can not be taught in a "cook book" fashion. Skill

[1] Gordon, Robert A., and James Edwin Howell, *Higher Education for Business*, Columbia Univ. Press, New York, 1959; and Pierson, Frank C., *The Education of American Businessmen*, McGraw-Hill Book Co., Inc., New York, 1959.

[2] Gordon and Howell, *op. cit.*, p. 90.

in communication involves both quantitative and qualitative skills. To develop quantitative skills the mathematics of the general education is used as a base for statistics and accounting.

Therefore, we conclude that the essentials of the professional component of the Agricultural Business program are in the areas of decision making and principles of behavior of both the human and non-human factors. Courses in Agriculture need to stress principles which will be true in the future rather than an introductory survey of the field or a factual study of today's best varieties. Similarly, courses in business should develop an understanding of the business firm, not teach rules of thumb for marking prices. This injunction could go on, but the basic fact remains: The professional component of the Agricultural Business program should be decision oriented, and should emphasize principles.

GOALS OF EDUCATION AND THEIR RELATION TO AGRICULTURAL ECONOMICS CURRICULA

ALLEN B. RICHARDS
University of California, Davis

AMERICA today is preoccupied with educational matters at all levels. This discussion is concerned with two aspects of education: (1) the goals of education and the framework within which these goals are approached, and (2) the relation of these goals to agricultural economics curriculum.

Goals of Education. The goals of education are full enhancement of the faculties of observation, analysis, judgment, and expression, and attainment of the moral and mental characteristics that *impel* us to accept the consequences of our expression. These goals are fundamental to man and common to all areas of education. They are the qualities we usually look for in the "educated" man and hope to instill in our students to fit them for future responsibilities. When we cease to move toward these goals, we cease to have meaning.

We cannot approach the goals of education without a context or frame of reference within which to operate. This frame of reference is the theory and substantive material we must have in order to observe, analyze, judge, and express ourselves *meaningfully.* Theory can be considered a fundamental and efficient context for selecting relevant phenomena from the welter of events we experience. Substantive material, on the other hand, is a collection of the facts that are germane to a particular activity. These facts are collected in an orderly fashion, sometimes with the aid of the higher context, theory. Thus, both substantive material

and theory, when combined, provide us with a complete context within which to approach the goals of education.

Agricultural Economics Curricula. Students coming into agricultural economics have a variety of backgrounds. Most are weaker in fundamental skills than in anything else. It is also evident that these students proceed into an extremely great variety of jobs. In many cases, the only common ground among these activities is their general orientation to agriculture. Thus, curricula of agricultural economics need to place greater emphasis on fundamental skills. Not only will this lead students more efficiently to the goals of education but it will also provide them with an adaptable foundation on which to build in later years.

Our curricula are already moving to more fundamental areas, and agricultural subjects are receiving less emphasis. At California (Davis) we teach statistics, economic theory, accounting, business law, and business management within the department. This is a trend we should expect because it is a move to emphasize the more efficient and lasting contexts applicable to future environment.

Despite much comment about shortening the period of college education, there is much to be said for increasing it by a year. This would give an additional year for further emphasis on strengthening of the undergraduate training in tools of analysis and expression. Moreover, with tremendous changes in technology and increases in the complexity of economic activity there appears to be reason to increase the length of study. Shortening the period would require that the efficiency of the educational process be increased more rapidly than technology is changing.

Undergraduate work should be concerned largely with broad fundamentals. Under this type of program, agricultural economics courses for majors might be limited to two one-year seminars—one dealing with the political, economic, and social factors affecting the farm firm; the other specifically concerned with nonfarm agriculture and agriculturally related activities. In addition, a few key survey courses for nonmajor students would provide the substance of agricultural economics courses taught by individual departments.

These suggestions indicate that agricultural economics as a context may play a lesser role in coming years. If this is so, we must be forward-thinking enough to change with these developments. It is not the agriculture of today that we are training our students to live with, but the agriculture of 10 to 20 years hence; an agriculture that, if the past is any guide, will be radically different from present agriculture. Therefore, it is the collection of faculties of observation, analysis, judgment, and expression, and the moral and mental characteristics that *impel* us to accept the consequences of our expressions that will be the lasting results of our educational efforts. It is to these goals that our curricula should be directed.

THE EFFECT OF SPLIT APPOINTMENTS ON UNDERGRADUATE TEACHING

MILTON M. SNODGRASS
Purdue University

THE PAPER challenges the effectiveness of the teaching-research appointment for staff involved in undergraduate teaching.[1] It is argued that the objectives of maximizing returns to the student and to the professor are incompatible. Therefore, the paper concludes that the classroom presents a conflict situation wherein the undergraduate student suffers.

The use of the word "research" is restricted to include only the rather typical applied, problem-orientated type of research which constitutes the majority of projects financed by agricultural experiment stations. More basic or fundamental research pursued without pressure of time and which involves considerable library reading are undoubtedly helpful to the teacher either to elevate his scientific stature or to aid his communicative ability in the classroom.

The majority of arguments favoring the teaching-research appointment have centered around aspects of complementarity in the relationship. In the beginning, the emphasis of our land grant college system was placed almost entirely upon undergraduate teaching and early research effort was devoted to broad, basic problems. The argument of complementarity in the teaching-research relationship was valid and had a favorable effect on fund requests for research purposes. But the land grant institution has evolved into a highly organized research institution wherein the major emphasis seems to be placed on bigness, gaining prestige (primarily through research prowess), and public relations. Maximizing benefits to the undergraduate has been relegated to a minor role.

Four factors are discussed which support the basic premise of the paper:

The Prestige Factor. Professors prize the split appointment. This is largely because professional prestige from research so heavily outweighs that from teaching that any individual or department head must beckon the call.

A Hedge is Convenient. The split appointment can be an opportune hedge for both the individual and the administration. A mediocre performance in teaching can be explained conveniently by pressure from research or vice versa. It is likely that only a small part of the growth and success of agricultural schools is due to teaching prowess. A high prestige

[1] The paper is limited to a discussion of the teaching-research appointment and does not consider the less common teaching-extension appointment.

rating is more easily assured by research. Also, liberal entrance standards along with lower cost give the state-supported university a net competitive advantage.

Peripheral Area Osmosis. An argument that is also used contends that students can be motivated by and intrigued with a subject by rubbing shoulders with a research man. While this may allow the student insight into a peripheral area that otherwise would not be investigated, there is danger that narrow research findings may take precedence over basic principles in the classroom.

The Human Aspect. While there are exceptions, it is highly improbable that genuine interest and ability in both teaching and research can be found in the same individual. To maximize student benefits, a teacher cannot let his job end in the classroom. He must be basically interested in people and their welfare. A research man is intrigued by impersonal empirical evidence and its meaning.

To summarize, maximization of professor and student benefits are currently not compatible objectives. Good research performance (for most people) involves a rather high degree of training and specialization. Good teaching performance, which demands interest in student welfare, is certainly not assured by a Ph.D. degree. As a result, a conflict arises wherein it is difficult for the staff member to remain honest with himself, his students, and with the administration. Teaching performance will tend to suffer, but this fact is not crucial either to the individual or to the administration because performance is rarely evaluated and the quasi-monopoly on students in the state-supported universities assures continued "business."

PROPOSALS FOR IMPROVING COLLEGE TEACHING

LOYD K. FISCHER AND ROBERT M. FINLEY
University of Nebraska

MAXIMUM results have not been achieved in the teaching of college undergraduates. Partial explanation for this failure lies in (a) ineffective teaching programs and (b) inadequate staffing. Nor will this problem solve itself. Each passing year the provision of an adequate education to increasing numbers of students becomes more difficult as the environment increases in complexity and the fund of knowledge expands. The continued rapid growth of knowledge poses awesome problems to student and educator, not so much from the startling advances within the various fields, but much more from the revelation of an all-pervasive interdependence among the various natural sciences and between the natural and the social sciences. Comprehension and appreciation of these inter-

relationships requires breadth of training. But if students are to achieve an understanding of the place in the general scheme of things of knowledge in their own fields, they must first be well versed in their major area of interest. The problem of balancing "breadth" and "depth" in education cannot be resolved by shifting emphasis between "general" and "specialized" training. Both are essential.

On the other hand, training could be improved both in breadth and in depth if (a) subject matter areas were reoriented away from traditional departments into broader and more realistic fields, (b) courses were presented in each field which would integrate the knowledge within and between subject matter areas, and (c) curricula were established with rather rigid sequences of basic courses preceding applied courses.

Students' time in college should be divided into two general periods: (a) basic and (b) applied. The common procedure of preceding "applied" courses with appropriate "basic" courses could be simplified and made more effective if the initial courses in the various curricula were broken down into meaningful groups, such as: (a) General courses, including communications, mathematics and logic; (b) Natural sciences; (c) Social sciences and humanities. In colleges of agriculture, applied courses in the agricultural sciences should be presented in much the same manner. Courses in an agricultural college may be categorized as: (a) Animal science; (b) Plant science; (c) Chemical technology; (d) Mechanical technology and (e) Agricultural economics and rural sociology.

Every effort should be made in both the basic and applied training, to integrate each subject into the general fund of knowledge. In fact, special courses should be taught with such integration as their sole objective. In most colleges attempts are made to achieve breadth in education by requiring students to take courses in a number of fields. Students are usually permitted to select a number of specific courses from a wide variety offered. Unfortunately, they are rarely given competent guidance and direction to permit construction of adequate programs. Also unfortunately, these "broadening" courses often present the trivia, not the basic principles of their respective fields. Too often, students who come to college for an education receive mere information. Every effort should be made to teach students not the answers to questions but how to answer questions.

Good teaching programs can contribute much to the effectiveness of college teaching. On the other hand, while weak teaching programs are not necessarily fatal to good education, weak teachers are. Here too, colleges and universities have fallen short. They have relegated teaching and teachers to an inferior status. Rank, pay and prestige accrue more generously to those involved in writing, research and administration.

Perhaps the failure to reward good teaching more generously reflects the attitude of the public and of college administrators as to its relative

worth. More likely the failure to recognize and reward good teachers is a result of the belief that: (a) Quality of performance of non-teaching duties is an adequate indicator of teaching competence, while (b) Teaching performance is difficult, if not impossible, to appraise with reasonable accuracy.

That a staff member's performance as a teacher can be determined by observing the quality and quantity of his other activities is simply not in accord with the facts. In the first place, those who teach best often devote a large proportion of their time to teaching. Conversely, others who excel in writing, research or administration may, from necessity or by choice, neglect their teaching. Thorough knowledge of the subject matter on the part of a teacher is a necessary, but not a sufficient, condition for good teaching performance. Certainly the fact that a staff member is an excellent and productive researcher does not preclude his being a good teacher; neither does it assure it. At some point teaching and non-teaching duties become competitive. Such competition for time and energy, under our present system of granting more generous rewards for performance of non-teaching duties, has often resulted in less than satisfactory teaching performance.

However, teaching is difficult to appraise accurately. Furthermore, rewarding some staff members in a manner commensurate with their teaching performance would certainly result in a reduction in their compensation. On the other hand, teaching faculties should take the lead in devising, perfecting and applying measurement techniques. Until teaching is properly evaluated and good teaching is accorded the respect and reward it deserves, college teaching will suffer.

SOME TRAINING NEEDS OF EXTENSION WORKERS IN FARM MANAGEMENT AND PRODUCTION ECONOMICS

E. P. CALLAHAN
*Federal Extension Service, USDA**

LIKE that of any other professional person, an economist's professional usefulness depends on what he is able to accomplish—not merely on what he knows.

This principle is especially apparent in *extension* "teaching" of farm management and production economics, where the "students" (farmers, farm suppliers, marketing firms, etc.) put what they learn to *immediate* use. The teacher must be able to show how to solve real problems.

* The views expressed herein are those of the author. They do not necessarily represent those of the Federal Extension Service or the Department of Agriculture.

The Extension teacher of farm management and production economics needs: (1) the ability to demonstrate the use of the decision-making process, (2) thorough grounding in the principles and concepts of production economics, and (3) realistic economic theory that adequately explains what happens in agriculture and related industries and services in today's economic world.

His training needs to include a great deal of rigorous practice in stating economic problems and working out and testing solutions with the use of the applicable economic principles and concepts.

The task of the extension economist on the job is to select the economic principles and concepts that are applicable to the problem at hand, to assemble the needed information, and to put the information into the framework provided by the principles and concepts. The most versatile tool for doing this is the partial budget. He needs practice to become skillful in its use. He also needs practice in using other tools—such as the estimate of probability—to supplement partial budgets in demonstrating solutions of problems.

Much classroom practice in solving farm management and production economics problems deals mostly or altogether with factors to which *cardinal* numbers or values can be assigned. This is understandable and perhaps necessary in introductory courses. Yet the extension economist needs to become skilled in demonstrating solutions of real problems, that nearly always involve *ordinal as well as cardinal* numbers. Economic concepts and principles are just as valid and useful in their solutions. His training needs to include more practice on real and realistic problems that involve values, preferences, and aversions as well as desire for more income.

The extension economist obviously needs to have a well-rounded education. He needs to continue to be a student all of his life. There are three reasons why this is true:

First, nothing can fully substitute for experience in gaining skill in motivating farmers and others to study and apply economic concepts and principles. But one must study one's experience to profit from it.

Second, the extension economist's need for adequate economic theory can be met only by keeping up to date. The structure of our economy changes through time. Theory that satisfactorily explained its behavior a decade or so ago is no longer fully adequate.

Third, a well-rounded education is not built for a lifetime. It must be cultivated, and it must grow and continue to grow. If it ceases to grow it soon ceases to be well-rounded.

CONTRIBUTED PAPERS: LAND ECONOMICS, FARM FINANCE, AND INSTITUTIONAL ECONOMICS*

CHAIRMAN: MAURICE M. KELSO, UNIVERSITY OF ARIZONA

THE INCORPORATION OF FARMS AND RANCHES—A TECHNOLOGICAL BREAKTHROUGH IN AGRICULTURAL "FINANCIAL-LEGAL" MANAGEMENT

DEON W. HUBBARD**
Oregon State College

AGRICULTURE in its tremendous technological evolution and increased farm-ranch business size is encountering increased complexity in its "financial-legal" management. The corporation, long used by business and industry, is beginning to receive considerable attention in agriculture. The corporate form of business organization can be adapted to commercial agriculture with notable success. It can materially assist certain farmers and ranchers in their financial-legal planning and management, particularly in accumulating, maintaining, and transferring to the next generation the "agricultural estate" with maximum production capacity and with minimum taxes, costs, and capital shrinkage. Thus a farm or ranch can be maintained and operated as a perpetual economic unit.

The development and continued maintenance of an economic farm-ranch unit over time is of important concern to farm owners and economists. Society as a whole is concerned with the socio-economic losses incurring in the turnover of farms; the struggle of recapitalization every generation; small uneconomic units; and inadequate capital to meet the technological needs of a dynamic agriculture. Regardless of how transfer of property is to be made; serious problems of division arise if more than one new owner is to receive property interests. The problem is primarily the division of the farm-ranch unit which is *not* readily divisible. In this phase of financial-legal management the corporation can make a significant contribution to agriculture. Shares of stock representing divisible portions of the whole farm or ranch unit can be bought, sold, traded, given as gifts, willed or passed by inheritance laws at death—without

* These Contributed Papers are published here in abstract only. The papers in full, or additional information regarding the studies reported, may be obtained from the authors upon request.

** I am indebted to Grant E. Blanch for encouragement and suggestions on this paper, and to the Department of Agricultural Economics and the Oregon Agricultural Experiment Station for my participation in the project: "An Evaluation of the Corporate Forms of Ownership for Family Farms and Ranches."

legally dividing, breaking up or disrupting the farm business. The corporation as a separate legal, economic entity distinct from its stockholders can own property, conduct business, make contracts, and is responsible for its own liabilities. It can live forever and need not depend upon the life of a single individual. The transition of ownership and the responsibility of management can be transferred to new owners in a systematic, businesslike procedure of stock transfer. Such devices as stock gifts, stock purchase and transfer agreements and voting trusts can be developed to divide and transfer farm ownership, yet maintain control where desirable and still keep the farm unit intact. Accumulating, maintaining and transferring an estate of adequate economic size is accomplished by careful planning and cannot be left to chance or inheritance laws.

With increased capital in farms and ranches, serious consideration is needed concerning the liability of individual owners and the farm business. The corporation, with its limited liability, is a device to separate the liability of owners' personal assets from business assets or vice versa. It may also be a means of protecting one farm or farm enterprise from another, or from other business interests.

Certain unfavorable tax conditions upon small farm-ranch corporations were removed by recent federal tax law changes. Most small corporations can now take a "tax-option" and elect to be taxed as a partnership, doing away with corporation income tax which sometimes resulted in double taxation.

Creditors should feel more secure where the business life is perpetual and the business management and loan repayment does not depend on the life of a single individual. However, other lenders may look askance at the limited liability offered stockholders and may require their personal signatures on loans. The acquisition of equity capital through the public sale of securities has limited possibilities, although it is not likely that many farm corporations will be able to raise capital in this manner.

Most capital used in agriculture today has been acquired from earnings of farmers, capital gains, inheritance, and gifts—internal equity capital rather than external financing. Many farm people have a psychological aversion to debt, particularly to the idea of perpetual or eternal debt. But with limited liability and the ownership of debt belonging to this impersonal, "amoral" entity rather than directly to individuals, the corporation can be a means of minimizing internal credit rationing and can stimulate the use of additional borrowed capital where the marginal efficiency of capital is still high.

The corporation can be an important management tool in providing retirement benefits and encouraging retirement from agriculture. This can have an invigorating effect in providing an opportunity for additional young people in farming. A corporate officer-stockholder as an employee

of the corporation can build maximum social security benefits independent of farm earnings. After retirement, with social security as a good base, he can earn the maximum allowable under social security as an advisor or consultant to the corporation. With this and income from interest, dividends, rentals, pension or profit sharing funds, an older farmer can have an adequate and secure retirement income. This may be supplemented by selling some of his securities and thereby utilizing some of the capital gains and forced savings acquired in the farm without selling off farm assets or expending capital needed for farm operation.

The socio-economic consequences of corporate farming will not be the elimination of family farming. The corporation can be a major tool for maintaining the family farm while at the same time allowing certain persons to leave the farm without losing their equity in farm property or withdrawing needed capital.

THE PROBABLE ROLE OF LARGE-SCALE LANDLORDS IN FARM TENANCY IMPROVEMENT

RUSSELL L. BERRY
South Dakota State College

IF LARGE-SCALE landlords were leasing many farms in the same community, would the tenant's freedom of production or freedom to be efficient be increased? More specifically would large-scale landlords increase the tenant's "three F's" of farm tenancy improvement: (1) Fixity or security of possession or tenure, (2) Freedom of operation or management, and (3) Freedom of improvement? The hypothesis of this paper is that an increase in the number of large-scale landlords in the United States (each with, say, 20 or more efficient-sized farms) would greatly increase the tenant's three F's, even though a one-year or year-to-year lease were used and tenancy legislation similar to that of England were not adopted.

The evidence available suggests the following sub-hypotheses for further study:

(1) As the number of tenants per landlord increases the landlord-tenant relationship must become less personal. As the relationship becomes less personal or more objective, the tenant acquires more freedom of production (the three F's). This is supported not only by evidence from large estates here in England but by evidence from other large firms regarding employees, clients or customers.

(2) Because of the public relations problem and the need for efficiency of management, large-scale landlords would tend to use fixed cash, fixed produce, or sliding scale rents which cannot be affected by either the landlord or the tenant after the lease is signed.

(3) The adoption of such fixed or sliding scale rents would eliminate much of the landlord's concern over whether the tenant was doing a "good job of farming" that legitimately exists when the rent is paid as a share of the produce. As a result, the landlord would be more willing to keep the tenant as long as he paid the rent as specified and maintained the productivity of the property. Also, since continuous leasing is more likely under large-scale landlords than present small-scale landlords, long term occupancy would result.

(4) Under these conditions the tenant would eventually want to make improvements on the farm. Because the tenant can often make such improvements in his spare time at much less than it would cost if the work were hired by the landlord, the right to make needed improvements would often be granted. Likewise, arrangements would often be made to compensate the tenant for his unexhausted improvements.

(5) Because the problem of improvements is one of the main reasons for landlord-tenant disagreement, legislation concerning freedom to remove improvements or claim compensation for them is likely to be the first modern tenancy legislation adopted in this country. The steps outlined above approximate the way England arrived at her modern tenancy legislation. The evidence from two English-type estates in this country support these hypotheses. These estates are the Scully Estate of Illinois, Nebraska, and Kansas and the Wadsworth Estate of Western New York.

OPERATION OF THE IRRIGATION WATER RENTAL MARKET IN THE SOUTH PLATTE BASIN

RAYMOND L. ANDERSON
Agricultural Research Service, USDA, Fort Collins, Colorado

INTENSIVE agriculture in the semiarid West depends upon adequate water supplies. The appropriation doctrine of water rights contains rigidities that create problems of optimum water allocation among farms even in areas of adequate supply. Under strict appropriation doctrine, water is attached to the land by prior development of irrigation works. Whenever an appropriator fails to use the water, or allows another to use it, his right can be lost to another.

In contrast to this, private mutual irrigation companies in the South Platte Basin have developed a rental procedure for seasonal transfer of irrigation water to accommodate the varying needs of water users.

Three factors make water rental possible in this region:

(1) Company ownership of water rights, allowing the water to be used anywhere on the system, rather than having it attached to a specific tract

of land. Farmers receive water according to the amount of stock owned in the company. The stock can be bought and sold or rented at will.

(2) Development of company storage reservoirs, which deliver late-season water on a demand basis, according to amount of stock held.

(3) Availability of Colorado-Big Thompson trans-mountain water, which is freely transferable between water users anywhere in the Northern Colorado Water Conservancy District. The area covered is 70 miles north and south, and extends northeast about 100 miles.

Water rental procedures vary between companies, with the larger companies generally maintaining a rental service where water can be exchanged. Direct-decree water, storage water, or Conservancy District water may be transferred. The rental price is normally the same regardless of source.

In dry years more transfers occur because of shifts from low-return uses on some farms to high-return uses on others. In 1959, prices of rental water ranged from $2.50 to $8 per acre-foot. During dry years the price is reported to go as high as $30 per acre-foot, but community opinion generally keeps prices lower than this, and thus restricts the amount of water that would be transferred in some years.

During 1959 there were 1,021 rental transactions in five major companies and the Northern Colorado Water Conservancy District, transferring the use of almost 90,000 acre feet of water. Most transfers occur in July, August, and September, with the highest monthly volume of water moving in September.

If the water transferred yielded $20 more return per acre-foot, and 60 percent of it reached the new location, these transfers would add around $1,000,000 to the gross agricultural production of the area. Studies in Colorado indicate that the marginal value product of irrigation water may be as high as $12 to $78 per acre-foot, depending on use.

Marginal productivity theory assumes that resources in a competitive industry will be allocated so that the value of the marginal product of any factor will be equal between firms. Under the appropriation doctrine returns to water can vary widely between firms. Rental provisions help adjust this "malallocation" of water.

By turning to a market mechanism, losses in crop production are reduced, and the possibilities of legal battles over water rights are diminished. Changes in the rules of the game in ownership and use of irrigation water allow greater efficiency in the use of this scarce resource and greater stability of ownership. These new rules and customs bring the land-water relationship into better adjustment than is normally found in western irrigated agriculture, and may well serve as an example for other areas in adjusting for the varying needs of agricultural water users.

NATURAL RESOURCES AND ECONOMIC GROWTH

RALEIGH BARLOWE
Michigan State University

NATURAL resources and land were treated by the Physiocrats and the early economists of the Classical School as a prime input in the economic production process. Much less emphasis is given to these factors by most present day economists. Many give little or no consideration to the land factor in their writings and teachings, and some have tended to write off land and natural resources as an insignificant contributing factor in the process of economic growth.

Many factors have contributed to this about-face in economic thinking. Increased agricultural productivity has made it possible for economists and others to concentrate on problems other than man's age-old concern with the need to secure food, clothing, and shelter for survival. Industrialization, the urbanization movement, and the growing complexities of modern life have favored specialization of labor among economists and have caused many to work on phases of economics only indirectly concerned with natural resources.

Important as these developments are, they do not justify any depreciation or playing-down of the effects of natural resources on economic growth. Resources such as space, physical location, soil, sunlight, air, and water are fundamental for life and are necessary for all types of economic activity. They are frequently taken for granted in our modern world but still have significant impacts on the successful location and operation of economic enterprises. History shows that they have played vital roles in the development of the United States and other countries. Moreover, possession and access to key natural resources has long been an important geopolitical goal on the world political scene.

Three reasons may be given for the tendency of many present day economists to underrate the importance of natural resources. First, many have been overly impressed with statistical reports that show that land is declining in importance as a source of income and value relative to other factors. There is nothing unusual or unexpected about this trend. Our supply of land has remained fixed while our supplies of capital and labor have increased both in quantity and quality. Moreover, the introduction of new products and the proliferation of new services in our society have made it possible for many more groups and individuals to claim shares of the consumer's dollar.

A review of the statistics on national wealth in the United States indicates that the value of land dropped from 38 to 15 percent of the national total during the 60 years from 1896 to 1956, and that the value of

land and land structures dropped from 78 to 64 percent of the national total. This decline in the relative importance of land values loses most of its significance when it is also noted that bare land values experienced a nine-fold increase and the value of land and structures a nineteen-fold increase during this same period. The declining relative importance of land springs not from any drop in productivity or value but rather from increasing investments in equipment, inventories, and foreign assets.

A second reason for the underrating of natural resources stems from the tendency of many economists to ignore the basic limitational significance of natural resources and to treat them as unimportant because they are are plentiful and free in a market sense. We should be happy that many natural resources are "free goods." At the same time, however, it must be noted that they play a necessary role and that no resource input, regardless of its cost, can be unimportant as long as it is capable of becoming a critical factor in production.

Finally, some economists tend to credit practically all increases in productivity to labor and capital when in fact many of these increases could be credited to land. Labor and capital have certainly made great contributions to increased productivity; but so also have the new technology and know-how that we are using to better harness the forces of nature. Much of the added productivity associated with these developments could well be treated as a return to land.

CONSERVATION AND AGRICULTURE ADJUSTMENT—COMPETITIVE OR COMPLEMENTARY?

MELVIN G. BLASE*
*Agricultural Research Service, USDA, Ames, Iowa***

WITH the expansion of surplus stocks, many persons question Federal expenditures for conservation. At the same time, conservationists call attention to present rates of erosion and argue that the bubble of surpluses will soon burst. I do not intend to defend here either position; rather my purpose is (1) to examine the terms "conservation" and "agriculture adjustment," and (2) to suggest some of the implications of their interrelationships.

Conceptual model

To avoid the ambiguities associated with the term "conservation," discussion here is focussed upon "soil erosion control," defined as the preven-

* The opinions expressed herein are those of the author and do not necessarily represent the views of the Farm Economics Research Division, ARS, or the U. S. Department of Agriculture. The author wishes to express his appreciation to the following of his colleagues who reviewed earlier drafts of the paper: Virgil Hurlburt, Arnold Paulsen, Walter Butcher, Donald Osbun, and John Timmons.

** Presently on military leave with the U. S. Air Force.

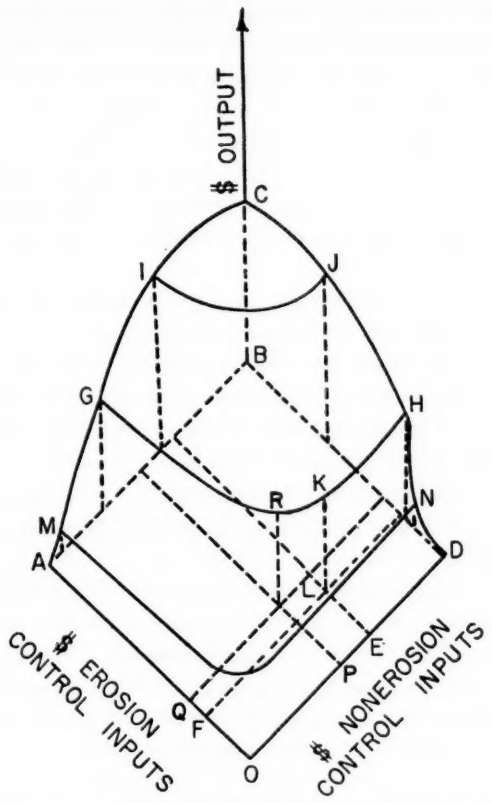


FIGURE 1. A CONCEPTUAL RETURNS SURFACE REFLECTING PRODUCTION RESULTING FROM COMBINATIONS OF EROSION CONTROL INPUTS AND NON-EROSION CONTROL INPUTS, EXPRESSED IN DISCOUNTED MONETARY TERMS AT ONE POINT IN TIME.

tion of diminution of the discounted value of future production from a given area of soil, a given level of expected production technology, and a given discounted value of labor and capital (net of the value of the soil-erosion-control input).[1]

This definition is partially explained in figure 1. It can be hypothesized that the value of output is similar to the discounted value of expected future income for the relevant planning horizon from the resources employed, e.g., maximum output *BC* results from inputs *OA* and *OD*. When erosion-control inputs are increased from *O* to *F*, output goes through a stage of increasing returns between *D* and *H*. This area is coincident with the prevention of erosion exceeding the level of economic irreversibility.[2]

[1] The initial point of departure for this definition can be found in Heady, E. O. and Scoville, O. J., *Principles of Conservation Economics and Policy*, Iowa Agr. Expt. Sta. Res. Bul. 424, 1955.

[2] Economic irreversibility is the point at which the anticipated discounted marginal costs of restoring the physical productivity of the resource exceed the discounted

At a low level of output, isoquant *MN*, there is nearly perfect complementarity between erosion-control and non-erosion-control inputs. Above isoquant *GH*, erosion-control and non-erosion-control inputs probably can be substituted for each other over a wide range. As maximum output is approached, the range of substitution narrows again until the maximum output can be produced by only one combination of inputs. Throughout the surface the economic problem is to produce the desired output with minimum cost (minimum sum of the distances from the origin on both axes).

The model is static and must be revised as estimates improve, knowledge grows, and production relationships change. Decisions of resource allocation must be made at any one time on the basis of the current estimate of the relevant portion of the response surface. As the surface shifts, some resources can be reallocated in later decisions. Nevertheless, the optimum combination of erosion-control and non-erosion-control inputs will depend upon the portion of the returns surface relevant at a point in time to the decision maker, either an individual firm manager or a representative of society.

A scientifically meaningful definition of agricultural adjustment is: the process which will result in a use of resources which causes their marginal value productivities, farm family values considered, to be comparable between industries and segments of industries.[3] Most students of the adjustment problem agree that some resources in agriculture need to be used less intensively both now and in the immediate future.

Interrelationships between soil erosion control and agricultural adjustment

Agricultural policy directed toward maximum economic development could benefit from several complementary erosion-control and adjustment programs. This potential complementarity results from the immobility and relatively fixed supply of land resources, and from the time distribution of output. Land has an opportunity cost approaching zero in nonagricultural industries. Transferring it to other industries will seldom contribute to maximum economic development. Land use can be adjusted to shift the distribution of output forward in time, but complete nonuse of land resources in any time period can be questioned from an economic

marginal returns expected to accrue to the factor plus its salvage value. For a given resource this point varies by time periods as a result of changes in (1) the demand for the factor, (2) the rate of discount, (3) costs of resource restoration, and (4) other production costs.

[3] Heady cites this as the relevant criterion for fashioning farm programs if specified conditions are met. Heady, E. O., "Feasible Criteria and Programs," in *Problems and Policies of American Agriculture*, Iowa State Univ. Press, Ames, Iowa, 1959.

viewpoint. In figure 1, nonuse of land pushes discounted output to a lower isoquant with nearly the same combination of inputs as before.

The fixed supply of land resources suggests land as the logical starting point for adjustment programs. The disinvestment of land resources through erosion in one time period may result in expensive restoration costs in later time periods if the level of economic irreversibility is approached. In highly aggregative terms, this is illustrated in figure 1. Prevention of excessive disinvestment by preventing erosion can result in output at R on isoquant GH, rather than at K. Hence, non-erosion-control inputs EP can be saved at the cost of erosion-control inputs QF. Adjustment programs that force disinvestment of land resources (because labor does not move out of the industry rapidly enough when net incomes decline) may result in more expensive output for the entire planning horizon due to resource development costs later in the planning horizon.

A time distribution of output is implicit in figure 1, assuming that output from erosion-control inputs occurs later in the planning horizon than that from non-erosion-control inputs. Preservation of the capacity of land resources to absorb future technology necessitates a minimum of erosion-control inputs, OF. Complementarity of adjustment and erosion control at levels above this minimum (e.g., shifting to the left from K on isoquant HG) involves shifts in the time distribution of output that may be advantageous to society. Consequently, further consideration must be given to the complementarity of erosion control and agriculture adjustment if a goal of maximum economic development is to be attained. In developing agricultural adjustment programs, it is necessary to begin with the land factor, if the long-run view is taken with respect to two highly interrelated problems.

CONTRIBUTED PAPERS: FARM MANAGEMENT AND PRODUCTION ECONOMICS*

CHAIRMAN: JAMES S. PLAXICO, OKLAHOMA STATE UNIVERSITY

WITHDRAWAL OF RESOURCES OUT OF AGRICULTURE IN AN EXPANDING URBAN-INDUSTRIAL ECONOMY

MARVIN W. KOTTKE
University of Connecticut

ECONOMISTS agree that moving resources out of agriculture must involve the simultaneous transfer of labor, land and capital to nonagricultural pursuits. Moving out only one resource will not solve the overproduction problem. One activity that appears to be drawing land, labor and capital to nonagricultural pursuits is urban-industrial expansion. This paper examines the effectiveness of this expansion in moving resources out of agriculture.

The approach used is to trace the destiny of resources on farms that are going out of business in an area where urban-industrial expansion is taking place and where agricultural incomes are relatively high. In this setting there is strong competition for resources from both the farm and the non-farm sectors. A study of an exodus of Connecticut dairy farms was made in 1959.

A brief sketch of how the dairy farms' resources were transferred or disposed of is as follows: (1) Only about 10 percent of the land and buildings resources were transferred to nonfarm uses—most of the other 90 percent were kept and held idle by the farmers. (2) Only about 30 percent of the equipment resources were sold and these went back into agricultural uses. (3) Practically all the livestock resources were transferred to other farms. (4) One-third of the labor resources transferred to nonagricultural pursuits.

At first glance, these observations appear to suggest that urban-industrial expansion has not been very effective in drawing resources out of agriculture. Further analysis, though, indicates that the large proportion of resources which are retained by farmers going out of business are placed in a semi-retirement status because of urban-industrial expansion.

Land. Apparently "inflation hedge," "speculation" and "investment growth" incentives provide the basis for holding land idle. These incentives can be traced to anticipations of further expansion of urban-indus-

* These Contributed Papers are published here in abstract only. The papers in full, or additional information regarding the studies reported, may be obtained from the authors upon request.

trial communities. Thus, a farmer may go out of production and still retain his land resources in the expectation that land values will grow. The land may be left idle even though its marginal value productivity is relatively high.

Capital resources. As with land most of the capital resources (buildings and equipment) are retained by the drop-out farmers, but the "growth in investment value" does not apply in this case. One possible reason that farmers do not sell more of their capital items is that these resources may have reached a state of obsolescence or have become "fully depreciated." Glenn Johnson's fixed asset explanation is appropriate here. When the salvage value of resources is low it may not pay to transfer them to other farms.

Labor. Mobility of labor is greatly enhanced when urban and agricultural sectors become intermingled. A farmer may quit his farm operations, become employed in an industrial concern and still not really leave the farm. Thus community ties are not broken. Most of the drop-out farmers who do not transfer to nonfarm pursuits go into retirement. By the time they go out of business they have usually reduced their operations to about 65 percent of the farm's capacity.

Implication. By retiring resources or transferring them to urban-industrial uses, farmers are manifesting a supply response. Resource withdrawal reverses the shifting of a supply function. In the Connecticut situation, resource withdrawal has been sufficiently high in recent years to have a restraining effect on total milk supply expansion. Since urban-industrial expansion appears to be effective in withdrawing resources it may offer insights to solutions to the over-all overproduction problem. Noteworthy is the semi-retirement status which is created for many of the resources taken out of production.

HETEROGENEITY IN AGRICULTURE: IMPEDIMENT TO DEFINITION OF THE FARM PROBLEM

HAROLD F. BREIMYER
*Council of Economic Advisers**

THE term "Farm Problem" is commonplace, yet seldom scrutinized. Its validity rests on the extent to which economic problems in agriculture exhibit a unified and distinctive character. The thesis of this brief essay[1] is that dynamic influences—technological, institutional, and

* This is a personal statement of the author and does not necessarily reflect a position of the Council.

[1] Copies of the full text are available on request to the author.

financial—are widening the diversity within agriculture and narrowing its differences from non-agriculture. The heterogeneity so disclosed is regarded as an obstacle to defining problems in agriculture and, equally important, to establishing a public image thereof. It is a partial explanation of conflicting positions of farm organizations and of the fading of the Farm Bloc as a legislative force.

First point of heterogeneity is the wide range that exists in size of farm. And although the trend toward larger farms is a general one, the technological base for greater size has a highly differential impact by type of farming. Eastern dairy farms and Plains wheatfields, for example, do not employ technology to equal advantage.

Second, the occupational and cultural identification of agriculture, a verity for centuries, is now on the wane as urbanites' yen for rural residence and many farmers' acceptance of off-farm employment transform much of rural U.S. into a farm-nonfarm continuum.

Commodity specialization within agriculture is on a marked rise, accentuating the long-standing conflicts among commodity groups.

Stratification of class interests within agriculture is an ever-present threat to farm unity. Labor-saving inventions have largely forestalled such a development. However, popular and official concern for the status of migratory farm labor testifies to emergence of a permanent labor class that may be small but is by no means negligible. In another respect, vertical integration could interfere with the single-class posture of U.S. agriculture; a growing class-consciousness has already been reported among integrated producers of broilers. And closely akin is the bringing of farm service, supply and marketing interests into the "farm problem" orbit, an agribusiness phenomenon, an aspect of which is seen in resistance among those interests to the Conservation Reserve.

Finally, accretion of very sizable capital values, quadrupling during 25 years of land-price inflation, has created great differences in economic status among commercial farm operators. These place the veteran farmer, beneficiary of capital gains, in a position sharply different from that of a young farmer newly entering farming. The veteran, approaching retirement, finds capital gains a great boon. The new farmer finds the higher asking prices for land an equally great burden.

The traditional single-image view of agriculture has been held not so much by farmers as by nonfarm people—and the latter hold the franchise on Federal farm policy. If agriculture is indeed heterogeneous, which of its many possible portraits will prevail in the future? In what fashion and with what sympathy will city people, long conditioned to a vision exemplified by Christmas-card art of Grandma Moses and Currier and Ives, see agriculture? The answers are of central importance to definition of the farm problem and to effective prescription for it.

NONFARM INPUTS IN AGRICULTURAL PRODUCTION: A RESEARCH PROPOSAL

MARSHALL HARRIS*

Agricultural Research Service, USDA, Iowa City, Iowa

THE proposed research is grounded in three major observations: (1) The widespread technological explosion of recent years in agriculture has greatly increased the use of nonfarm inputs of relatively high fixed costs; (2) production economic research has facilitated the rapid adoption of technological innovations, yet in the analytical processes nonfarm inputs generally have been assumed as given; and (3) marketing research has implemented the orderly flow of agricultural production from the farm to an expanding array of ultimate consumers, but has shown little concern about the problems of the farmer in acquiring nonfarm inputs.

Although production and marketing research has expanded rapidly upon the firm foundation of decades of fruitful results, only minor attention has been accorded the supplying of and demand for nonfarm inputs. Research is proposed that will furnish the farmer with insight into how to obtain the best nonfarm inputs under the most favorable circumstances and will give the supplier the necessary knowledge to perform his services to the farmer with maximum efficiency.

The proposed research would be concerned with, *inter alia*, (1) the form and quality of the nonfarm inputs necessary to maximize returns on each dollar expended, (2) the anticipation of production needs and the timing of purchase and delivery to permit suppliers to perform their services most efficiently, (3) information on quality and pricing and knowledge of production requirements so farmers and suppliers can establish an effective market relationship, and (4) adaptation of credit arrangements, storage facilities, and transportation processes to meet the needs of widely variable local conditions.

From the farmer's viewpoint the research would be designed to furnish him as much and as good, or even more and better, knowledge as to the acquisition of nonfarm inputs as is now available on the allocation and use of such resources and the disposition of the resulting production. From the supplier's viewpoint, the research would make available information needed in the efficient and effective furnishing of nonfarm inputs.

* Opinions expressed in this paper are those of the author and do not necessarily represent those of the Farm Economics Research Division, Agricultural Research Service, or the United States Department of Agriculture.

The initial research might well be confined to selected problems that arise from transactions between the farmer and the immediate supplier of nonfarm inputs. These investigations would reveal the most fruitful areas of research, to be undertaken subsequently, about problems of getting to the supplier the best quality of nonfarm inputs at the lowest cost.

The immediate objectives of the initial research would be (1) to discover and classify for scientific analysis the crucial problematic situations in regard to the supply and demand of nonfarm inputs, (2) to develop analytical techniques most applicable to these investigations, and (3) to draw such generalizations as are possible from the initial investigations. The ultimate objective would be to develop a body of knowledge on nonfarm inputs comparable to the existing store of information on production economics and agricultural marketing.

The initial research might well involve interdisciplinary investigations, that is, joint agricultural and commercial economic analyses. It would be concerned with the legal-economic complex surrounding the supplying of nonfarm inputs; and it would start with exploratory studies designed to gain insight into problem formulation and investigational methods at both the macro- and micro-analytical levels.

The central hypothesis of the proposal is that suppliers and farmers are ill-informed as to ways and means of getting most efficiently and effectively nonfarm inputs into the agricultural production process and that rapidly expanding scientific investigations are sorely needed to furnish the information.

CONSIDERATION OF TIME AND CARRYOVER EFFECTS IN MILK PRODUCTION FUNCTIONS*

GERALD W. DEAN
University of California, Davis

LIVESTOCK production functions must be interpreted with care, primarily because points on the production surface can be reached only by successively "feeding in" incremental feed inputs over time. This paper concentrates on the related question of possible "carry-over" effects through time. Solution to the "carry-over" problem depends on (1) an ex-

* The author thanks H. O. Carter, W. G. Brown and Magnar Ronning for helpful comments. Relevant references for this paper are: Brown, W. G. and G. H. Arscott, "A Method for Dealing with Time in Determining Optimum Factor Inputs." *J. Farm Econ.*, 40:666-73, Aug. 1958; Hoglund, C. R., *et al.* (ed.) *Nutritional and Economic Aspects of Feed Utilization by Dairy Cows*, Iowa State College Press, 1958, esp. Chap. 9, 15, 16 and 17; Ronning, Magnar, "Effect of Varying Alfalfa Hay-Concentrate Ratios in a Pelleted Ration for Dairy Cows," *J. Dairy Science*, 43:816, 1960.

perimental design allowing measurement of carry-over effects and (2) a method of incorporating this information into conventional economic analysis. Change-over trials (as opposed to continuous trials) may offer a feasible experimental set-up for this purpose. For example, a change-over dairy feeding trial at California, using 4 concentrate-hay rations, utilized 3 pairs of cows starting on each ration; at the end of each 28-day period the 3 pairs on a particular ration were "changed over" to each of the other 3 rations. Thus, the design allows measurement of "carry-over" between rations from period to period. Data from this trial are used to demonstrate a possible method of determining economic rations in the first two monthly periods with carry-over present. However, the method could be refined by additional variables and extended to three or more periods. Use of entirely pelleted feeds, with resultant low butterfat content from cows on high concentrate rations, suggests that the analysis here should be considered only illustrative. The experiment was conducted only at "full-feeding" of each ration. Thus, instead of estimating complete monthly "surfaces," only monthly "stomach lines" are estimated. The four equations estimated for the first two months are:

(1) $M_1 = 10.1488 + .7398C_1 - .1354C_1^2$

(2) $H_1 = 9.2450 - 1.2202C_1$

(3) $M_2 = 8.9767 + .9157C_2 - .1324C_2^2 + .2235C_1 - .0639H_1$

(4) $H_2 = 8.4884 - .4255C_2.$

M_1, C_1, and H_1 refer to cwt. of milk, concentrate and hay in month 1; M_2, C_2 and H_2 refer to like quantities in month 2. Equation (1) measures milk response in month 1 to concentrate fed to the "stomach line." Equations (2) and (4) measure the amount of hay required to "fill the stomach" for various levels of concentrate fed in months 1 and 2 respectively. Equation (3) measures milk response in month 2 along the "stomach line," incorporating the possibility of a one-period carryover effect; that is, milk in month 2 is a function of feed fed in boths months 1 and 2. Profit for the two periods is defined in (5), where P refers to price and K refers to non-feed costs "fixed" for the time period.

(5) $\Pi = P_{m_1}M_1 + P_{m_2}M_2 - P_{c_1}C_1 - P_{c_2}C_2 - P_{h_1}H_1 - P_{h_2}H_2 - K$

By substituting Equations (1)-(4) in profit equation (5), (5) can be solved in terms of C_1, C_2 and the prices.

Assuming

$$P_{m_1} = P_{m_2} = \$4,\ P_{c_1} = P_{c_2} = \$3 \text{ and } P_{h_1} = P_{h_2} = \$1.50,$$

the profit equation can be rewritten as (6):

(6) $\Pi = 47.5387 + 2.9955C_1 - .5416C_1^2 + 1.3010C_2 - .5296C_2^2 - K$

Taking the partial derivatives of (6) with respect to C_1 and C_2, setting

them equal to zero and solving provides optimum values of $C_1 = 276\#$, $C_2 = 123\#$. Substitution of these values in (2) and (4) provide $H_1 = 587\#$, $H_2 = 797\#$. If independence between periods had been assumed (i.e., Equation 3 replaced by $M_2 = 9.1548 + .8127C_2 - .1226C_2^2$), the optimum feed quantities at the same prices differ as follows:

$$C_1 = 165\#,\ C_2 = 88\#,\ H_1 = 723\#, \text{ and } H_2 = 811\#.$$

In the carry-over model, feed inputs in month 1 depend on prices in month 2, a feature which has obvious application with seasonal milk (or feed) price variation.

Several questions unanswered by this exploratory analysis are: (1) the feasibility of estimating "rate of feeding" carry-over as well as "ration" carry-over, (2) the possibility of estimation problems in more complex and realistic models including "cow ability," nonlinear lag relationships, more than one period carry-over effects, etc. These questions are being explored further in another dairy carry-over trial just completed using nonpelleted feeds.

WHERE TENANTS MAY PROFIT BY SEEDING CROPLAND TO GRASS

HARRY G. SITLER[1]
Agricultural Research Service, USDA, Fort Collins, Colorado

THE productivity of soils in eastern Colorado is quite varied, even within farm units. There are four million acres of this heterogeneous cropland in east-central Colorado, and about half of it is tenant-operated.

Winter wheat is the area's major crop, with a long-time average yield of 10.7 bushels per seeded acre. In an earlier study of owner-operators it was found that a wheat yield of 9.2 bushels per seeded acre was needed for returns equal to that of seeded pasture, and 6.4 bushels to cover costs of production.[2] Since wheatland is summer-fallowed for one year, it is necessary to divide wheat yields by two for an acre of wheat and an acre of seeded pasture to be comparable. As land productivity changes, beef output from seeded pastures is assumed to deviate from

[1] The opinions expressed in this paper are those of the author and do not necessarily represent the views of the Farm Economics Research Division, Agricultural Research Service, or the United States Department of Agriculture.

[2] Harry G. Sitler, "Economic Possibilities of Seeding Wheatland to Grass in Eastern Colorado," USDA, ARS 43-64, Feb. 1958.

TABLE 1. LANDLORD'S COSTS AND RETURNS WITH WHEAT

	Productivity Level		
	5.35 bu.	4.6 bu.	3.2 bu.
	(dollars)	(dollars)	(dollars)
Income	3.03	2.60	1.81
Expense	2.70	2.70	2.70
Net Income	0.33	−0.10	−0.89

the average of 23.7 pounds per acre at only one-half the percentage rate of wheat. Thus, our basic output assumptions for the different levels of land productivity become 5.35 bushels of wheat or 23.7 pounds of beef; 4.6 bushels of wheat or 21.8 pounds of beef; and 3.2 bushels of wheat or 19.0 pounds of beef.

Rental arrangements are usually one-third crop-share to the landlord, who pays land costs of interests and taxes. Returns for three levels of productivity are shown in Table 1. At these three levels of production the landlord's net income declines as land productivity decreases.

The tenant pays all operating expenses out of his two-thirds share (Table 2). He has about as much net income per acre as the landlord with average land (5.35), but his income declines much faster on less-productive land.

Can the tenant's financial position be improved by replacing wheat with seeded pasture and summer grazing of yearlings? Assuming that the landlord receives rent equivalent to wheat rent, and that average costs and returns for seeded pastures allow for establishment and use, the tenant would be worse off financially with average land (5.35) than he was with wheat (Table 3). At the lowest productive level he would lose only 24 cents, as compared to losing $2.07 with wheat.

In this study we have shown that under the assumed yields the tenant's loss would be less for the farm by having the low-productivity land in seeded pasture. Ten counties of east-central Colorado over a 28-

TABLE 2. TENANT'S COSTS AND RETURNS WITH WHEAT

	Productivity Level		
	5.35 bu.	4.6 bu.	3.2 bu.
	(dollars)	(dollars)	(dollars)
Income	6.07	5.22	3.63
Expense	5.82	5.77	5.70
Net Income	0.25	−0.55	−2.07

TABLE 8. TENANT'S COSTS AND RETURNS WITH SEEDED PASTURE

	Productivity Level Equivalent		
	5.35 bu.	4.6 bu.	3.2 bu.
	(dollars)	(dollars)	(dollars)
Income	1.71	1.76	1.99
Expense	2.67	2.49	2.23
Net Income	−0.96	−0.73	−0.24

year period reported 50 percent of the yields of wheat at less than nine bushels per seeded acre. Thus, it appears that tenants can save money in the long run by using low-productive cropland for seeded pasture instead of for wheat.

ESTIMATING LABOR REQUIREMENTS— A BROILER PRODUCTION EXAMPLE*

JAMES A. SEAGRAVES
North Carolina State College

THREE procedures available to farm management people for estimating labor requirements are surveys, labor records and time studies. In addition, data obtained through any of these procedures can be used to synthesize labor estimates.

The labor requirement for an enterprise depends, among other things, on: (1) the items included, (2) the production techniques used, (3) the skill of the individual, and (4) the pressure under which the individual is working. Before attempting to estimate labor requirements we should specify as exactly as possible which of these we are estimating. Such specification follows easily from a clear statement of the reason for which the labor requirements are being computed. Clear statement of purpose also makes one aware of the precision required in particular estimates. The main assertion of this paper is that it is important to specify clearly one's purpose before attempting to estimate, or select estimating procedures for, labor requirements.

The author had three reasons for wanting to know labor requirements

* Abstract of paper published with the approval of the Director of Research, North Carolina Agricultural Experiment Station, as Paper 1193 of the Journal Series. The author is grateful to R. L. Simmons, W. D. Toussaint and Dale Hoover for their helpful suggestions on the original paper; however he retains sole responsibility for errors and omissions.

for growing broilers: to help select feeding techniques, to estimate economies of size, and to obtain coefficients for efficiently managed enterprises for use in linear programming. He tried two different estimating procedures, interviews with selected growers and labor records kept by a select group of ten growers. Labor inputs were consistently over-estimated by the interview and the variance was very large. Labor records provided more precise estimates, though the variance was still large, and the estimates may still be above minimum labor requirements. Finally, synthetic estimates were computed. These estimates are arranged in Table 1 so that they can be compared with estimates from labor records kept by 10 growers in 12 different houses. These estimates only apply in circumstances described in the original paper. The estimates are thought to be reasonably good for purposes of selecting feeding methods. For economies of size uses one should compute the least cost feeding method for each size, and fixed time spent on management and such things as

TABLE 1. A COMPARISON OF SYNTHETIC AND LABOR RECORD ESTIMATES OF LABOR REQUIREMENTS FOR GROWING BROILERS, MINUTE PER BIRD PER 63-DAY BATCH

Labor item	Trough feeders		Tube feeders		Mechanical feeders	
	Synthetic	Labor records	Synthetic	Labor records	Synthetic	Labor records
Feeding	.64	.76	.44	.39	.24	.18
Watering	.22	.24	.22	.20	.22	.22
Other	.15	.27	.15	.26	.15	.36
Total	1.01	1.27	.81	.85	.61	.76
No. of weeks of observations		23	—	13	—	40

walking to and from the broiler house also should be added. For linear programming purposes, one might also need to include time spent cleaning the broiler house and preparing for a new batch.

In retrospect, the author feels that his efforts would have been more profitable, and he would have found a satisfactory estimating procedure sooner had he limited himself to one clearly defined purpose at one time. Since the selection of feeding techniques involves the fewest labor items and demands the greatest precision, it would have been tackled first. In order to achieve this required precision a combination of time study and synthetic budgeting procedures might have been most satisfactory.[1]

[1] For a good example of the use of time study data, see, W. D. Toussaint and P. S. Stone, "Evaluating a Farm Machine Prior to Its Introduction," *J. Farm Econ.*, 42:225-240, May 1960.

ECONOMIC IMPLICATIONS OF DROUGHT PROBABILITIES FOR HUMID AREA IRRIGATION

WAYNE F. EHLERS
Agricultural Research Service, USDA

AN IMPORTANT gap in research on the economics of irrigation in humid areas has been the lack of an adequate method for accounting for the effect of variability in natural rainfall in determining long-run costs and returns. Recently developed concepts of drought measurement and computation of probabilities of drought occurrence are used in the method shown here. This concept was developed by Van Bavel and used in nearly all the Southern states.

Experimental plot yields for corn for the period 1933 to 1957 were obtained from the Delta Branch Experiment Station at Stoneville, Mississippi. The growing season of corn was divided into four successive periods. Periods *A* and *B* preceded tasseling and are 33 and 32 days in length, respectively. Period *C* includes 14 days at tasseling and period *D* was the 31 day maturation period after tasseling. A relationship between the number of drought days in each of these periods and corn yields was determined by multiple correlation analysis. This relationship is shown in the following expression:

$$Y = 62.66 - 6.58\ B + 0.26\ B^2 - 0.55\ C - 0.45\ C^2 + 0.51\ BC - 0.88\ D + 0.19\ CD$$

where Y is the computed yield and the factors B, C, and D refer to the number of drought days in the respective periods. Period A was found to be not significant and was omitted. This expression accounts for 50 percent of the variability in corn yields.

Probabilities of occurrence of varying yield reductions caused by drought were determined by the extreme value statistical distribution method. In figure 1 the area below the curve D represents the expected average annual drought damage when given yield reductions are plotted against their probability of occurrence. If we assume an irrigation input that will reduce any expected drought damage by 5 bushels, the area below curve D_1 becomes the expected annual drought damage. Curve D_2 represents a 10-bushel reduction on damage, and so on.

Using a simplified historic relationship we find that the average yield reduction is approximately 5 bushels for each 1-inch deficiency in available water. Using this relationship, a value of $1.35 per bushel of corn, and irrigation costs by the siphon tube method of $4 per acre of fixed costs and $2 per application of 1.5 inches (net available to plants of 1-inch considering efficiency), we obtain the results shown in figure 2. This demonstrated the feasibility of irrigation of corn with an average amount

FIGURE 1

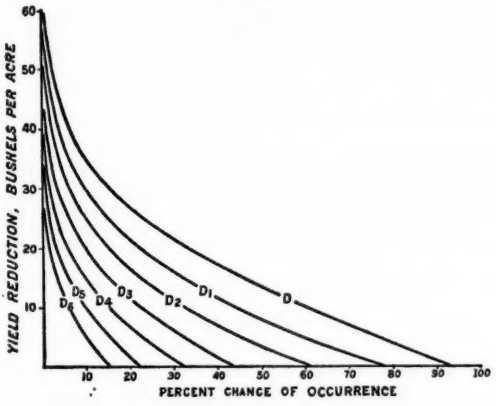
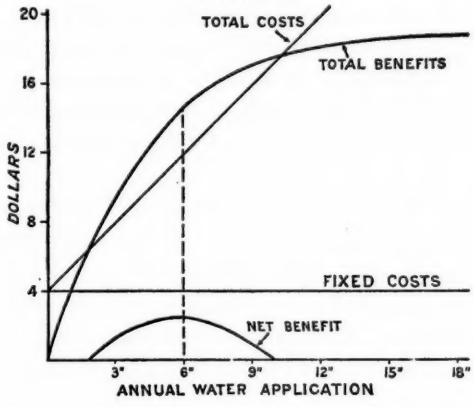


FIGURE 2



applied of 6 inches. This is not a guide for an irrigation program in a given year as individual years would vary. The production function for water developed here should be useful in making forecasts of crop production.

CONTRIBUTED PAPERS: CONSUMPTION, MARKETING, AND DISTRIBUTION*

CHAIRMAN: STANLEY K. SEAVER, UNIVERSITY OF CONNECTICUT

SHORT-RUN DEMAND AND SUPPLY CURVES FOR PERISHABLE VEGETABLES AND THEIR USE IN ANALYSIS OF INTERREGIONAL COMPETITION

DONALD E. FARRIS
University of Arkansas

SEVERAL complex analyses of interregional competition have been made, but each falls short of describing completely the complex economic relationships that are being studied. It is not necessary, nor will it likely ever be economical, to achieve a complete description, but if economists are to make accurate normative or positive forecasts of adjustments, more refinement in spatial equilibrium models and in the data used in the models is necessary. The purpose of this paper, then, is to discuss refinements of data for spatial equilibrium models for perishable vegetables.

The information required for a spatial equilibrium model includes demand and supply functions and the transfer cost between each pair of regions. Some perishable vegetables are good subjects of analysis because it is possible to obtain reasonable estimates of the needed relationships. The simplifying assumptions associated with these relationships and the spatial equilibrium model are not likely to prevent the analysis from yielding useful results.

Supply functions. The supply curve in the very short-run is largely defined by two values. The first is the quantity available for sale in a producing region during a time period such as one week. This can be represented graphically by a vertical line with respect to the quantity axis. The second value is the variable harvesting, packing and selling cost which is represented by a horizontal line with respect to the quantity axis. The first value is usually the only one relevant to the solution of the spatial equilibrium problem during a specific time period except for periods of overproduction. These values can be obtained and the cost is not prohibitive. They are useful for testing the efficiency of the market and determining best markets for region X and the locational advantage of region X, with respect to other regions.

* These Contributed Papers are published here in abstract only. The papers in full, or additional information regarding the studies reported, may be obtained from the authors upon request.

Long-run supply curves are more difficult to obtain, but it may be even practical to obtain these in some cases.

Demand functions. For perishable vegetables, both short-run demand and supply curves may be shifting at the same time making it very difficult to obtain useful statistical demand curves. Therefore a demand relationship derived from statistical data must not only be designed to shift between time periods but also include adjustments for the size of the market, section of the country in which the market is located, supplies on hand, supplies anticipated and different qualities. These could be converted to long run demand curves by correcting for expected changes in population and income.

Conclusions. Obtaining accurate demand curves is the biggest task in spatial equilibrium analyses for perishable vegetables. Other information can be obtained and the expense is not prohibitive. Unless a considerable volume of funds is available for obtaining accurate demand estimates, the transportation model may yield more information per dollar of research funds if the quantity used is observed consumption, actually determined by demand and supply forces in the market.

If the quantity purchased by a region is taken as given, shifts in demand and supply are reflected and demand and supply do not have to be separated to obtain a solution. Separate measurement of these functions is difficult and costly. Therefore, a good interregional analysis in perishable vegetables using both demand and supply curves might require a large expenditure, whereas questions of efficiency of the market, locational advantages and best markets for region X can be answered at considerably less cost with the transportation model and perhaps with almost as much accuracy. But to estimate future adjustments in production, demand and supply relationships are necessary and I have attempted to outline a practical means of obtaining them.

REFLECTIONS ON THE ECONOMIC IMPLICATIONS OF SHORT-TERM HOG FEEDING PROGRAMS IN THE MARKETING CHANNEL[1]

THOMAS T. STOUT[2]
Purdue University

SLAUGHTER hogs frequently have access to feed at Corn Belt concentration points where they are sorted by dealers and held for shipment to eastern packers. The paper discusses the possibility of innovational profit accruing to the feeding practice and speculates upon the implications. Recent investigation of the effect of such short-term feeding programs on shrinkage and dressing yield provides the empirical basis for the speculation.[3]

Unfed hogs lose an average of 1.2 pounds during several hours of sorting and confinement prior to shipment. Hogs receiving feed gain weight averaging 2.0 pounds, and weigh 3.2 pounds more than unfed hogs upon shipment. Although the immediate effect of feeding is to lower carcass yield, the yield of fed hogs will increase in transit, while that of unfed hogs will decrease. Sufficient distance (approximately 200 miles) will permit both unfed and fed hogs to display equal yields, although the carcass of the latter will be heavier, being based on the higher live weight. It seems evident that feeding hogs at concentration points can result in a greater quantity of pork at wholesale, and presumably at retail, with no increase in farm production.

Assuming equal by-product credits and other variables equal, the distant packer will bid the same price for either fed or unfed hogs, provided the yields on either are the same. While the packer would pay more in total for the heavier, fed hogs, he would pay at the same rate per pound. Market feeding, then, can, at least in the short-run, result in a greater supply offered at wholesale and retail at any given price.

But the dealer who sells the additional weight does not sell meat; he sells at least 3.2 pounds of feed and water, for which he receives live hog prices. If the payment on the gain in weight is more than enough to pay total feeding costs, then the dealer will receive an innovational profit Some circumstantial evidence lends credence to this possibility: (1) Were producers to sell hogs at the point where farm feeding operations reached a point of short-run equilibrium, concentration points might continue to

[1] Journal paper 1651 of the Purdue Agricultural Experiment Station.

[2] The author is indebted to J. H. Armstrong, V. W. Ruttan, M. M. Snodgrass and L. T. Wallace, Department of Agricultural Economics, Purdue University, for helpful comments and criticism in drafting the paper.

[3] Purdue Agricultural Experiment Station Project 733.

feed, benefitting from a lower average cost curve in the feeding enterprise, inasmuch as joint costs might already be wholly attributable to normal market operations. (2) Should an innovational profit exist, then feeding practices that are wide-spread in the country marketing system might contribute to an explanation of the existence of many markets that are too small to compete on the basis of volume alone. (3) During the period studied (March-October, 1959) feeding programs expanded as hog prices rose and were restricted as hog prices declined. (4) There is a current trend of packer buyers leaving markets where dealers flourish.

Implications. The policy of feeding slaughter hogs at concentration points may benefit producers in the short-run or the long-run only if: (1) Demand for hogs and for pork is elastic in the long-run. (2) Cost-saving efficiencies exist which are (a) shared with producers in the short-run, or (b) cause shifts in demand schedules in either the short-run or the long-run.

Should an innovational profit exist, then although market feeding may have permitted an increased supply at retail at no added cost per pound, a potential saving to consumers lies in a greater quantity being offered at retail at a lower price.

AN ANALYSIS OF RESPONSE VARIATION ENCOUNTERED WITH SELECTED INTERVIEWING TECHNIQUES IN CONSUMER MARKET RESEARCH

HENRY V. COURTENAY AND ROBERT E. BRANSON
Agricultural and Mechanical College of Texas

MANY consumer researchers tend to ignore the advantages and disadvantages inherent in different interviewing techniques. Hence, schedules are often used which are not suited to the objectives of the study.

Recent methods research conducted at the Texas Agricultural Experiment Station indicated that response variation occurred to varying degrees when direct versus projective interviewing techniques were used. The degree of variation appeared dependent on (1) the interviewing technique employed, (2) the classes of questions used, and (3) the characteristics of the respondents interviewed.

(1) Projective interviewing techniques, such as picture frustration questioning, generally evoked more specific answers than did comparable direct questions. In addition, projectives tended to elicit a convergent opinion or answer pattern whereas direct questioning resulted in a divergent pattern of opinions or answers. Direct questioning, in most instances, resulted in more rational and practical answers but projective

questioning tended to evoke underlying emotional and non-rational ones. It should be noted that underlying emotional and non-rational attitudes and motives as well as rational and practical ones generally exert influence on consumer behavior; therefore, projectives are important interviewing tools.

Direct questioning also resulted in more "socially acceptable" responses than projective questioning. Another important finding was that respondents tended to justify their actions or reasons on the basis of exogenous factors of circumstance when questioned directly whereas they more readily mentioned endogenous factors when projective techniques were employed.

(2) Some types of questions tended to result in a greater degree of response variation than others when different interviewing techniques were used. For example, the questions which seemed *most susceptible* to response variation were those of an opinionative and emotional nature such as questions concerning social status, justification of respondents' actions, class cultural associations, and those concerning the meanings of labels or symbols. On the other hand, the questions that appeared *least susceptible* to response variation included those concerning more factual information such as economy in buying, personal satisfaction regarding the selection and use of simple items and ranking type questions.

(3) The characteristics of the respondent interviewed was a further factor associated with response variation when different interviewing techniques were used. *Groups of respondents most susceptible* to giving responses that varied with the question asked and the interviewing technique used included those with characteristics such as income, occupation, race and sometimes age and educational levels that deviated from the norm or middle group of the sample. Others were respondents who did not ordinarily use the product or item under discussion, those who did not belong to the group discussed in the question, and those who tended to have ingrained biases with respect to the situation, product or item.

Respondents who seemed least susceptible to response variation when interviewing techniques were varied included interviewees whose racial, income, occupational and age levels approximated the norms of the sample.

A system of classification for question types and respondent types would permit (1) the selection of interviewing techniques and questions most suited to a specific project; (2) the selection of interviewing techniques appropriate for the respondent types being surveyed; and (3) the adequate evaluation of response patterns cognizant of respondent types, question types and interviewing techniques involved. This would tend to

help mitigate the problem of response variation and conflicting results when comparable studies are conducted by different research groups. It would at least be better than grappling with the problem with bare hands.

CLOTHING EXPENDITURES OF ACCOUNT-KEEPING ILLINOIS FARM FAMILIES, 1929-1958*

GEITEL WINAKOR
Iowa State University

CLOTHING expenditures of account-keeping Illinois farm families were examined in order to suggest possible causes of changes in clothing expenditures of the United States population. The hypothesis tested was whether the decreasing share of clothing in total expenditures was associated with a decline in the slope of the static Engel curve over time for these families.

Data were adapted from annual account summaries for the years 1929 through 1941, and 1946 through 1958. Engel curves relating clothing to total expenditures in each year were computed in double logarithmic form with expenditures weighted on a per capita basis. The slopes varied from about 0.8 to 1.6, fluctuating around unity. Statistical tests failed to indicate that the elasticity coefficient had varied significantly over the period examined. The level of the Engel curve, as indicated by mean clothing and total expenditures, apparently had shifted, but the shape of the curve had remained unchanged.

Least squares analysis was used to relate annual mean clothing expenditures to total expenditures, relative price of clothing, and time. Expenditures were adjusted to constant dollars using AMS indexes for apparel and family living, respectively. All variables except time were in logarithmic form. Total expenditure accounted for the greatest portion of the variation in clothing expenditure, with time more important than price. The downward time trend amounted to about 1.3 per cent per year. The expenditure elasticity obtained from time series data was lower than that indicated by the static Engel curve. This might be due in part to the nature of the AMS index, which reports prices of qualities farmers are buying currently, rather than of fixed qualities. Thus an indicant of quantity elasticity rather than of expenditure elasticity might have resulted.

* This paper was based on a portion of a thesis submitted in partial fulfillment of the requirements for the Ph.D. at Iowa State University. Major professor was Margaret I. Liston. The Illinois farm family account data were made available for this research through the courtesy of the Agricultural Experiment Station and Cooperative Extension Services in Agriculture and Home Economics, University of Illinois.

The time series analysis was repeated using information from all cells enumerated in the account summaries, weighted on a per capita basis. With this lesser degree of aggregation, the coefficient of expenditure elasticity approximated that obtained from the static Engel curve, whereas the downward time trend was more rapid than that obtained using annual mean observations.

Families having below-average total expenditures in respective years exhibited a higher expenditure elasticity for clothing and a greater downward time trend than did families with above-average expenditures. As the real income level of both groups improved over time, the lower group may have experienced increasing variety in the content of its consumption bundle, with decreased emphasis on clothing and other basic necessities. The higher expenditure group may have tended to shift to more expensive qualities of the same types of goods they had already been accustomed to using. The relative importance of home-produced goods for the two groups could have been a factor also.

More detailed study of farm family account data could contribute to understanding consumption standards of these families, and the possible interrelationship of these standards with family farm production. If account records could be obtained from broader population groups, information of value in demand projection might result.

RELATION OF PROFIT RATES TO INDUSTRY STRUCTURE IN THE FOOD INDUSTRIES

LEE F. SCHRADER AND NORMAN R. COLLINS
University of California, Berkeley

THIS study explores the relationship between certain measurable industry structural characteristics and the profit rates of large processing firms in 34 food industries. Space is available for only a portion of the empirical results and none of the supporting argument.

The 34 industries considered are the food industries as defined in the Census—that is, Standard Industrial Classification "2,000" group—excluding ice and combining beet and cane sugar. The 64 firms selected are those ranked among four largest in one or more S.I.C. industries, appearing in the list of the 1,000 largest United States firms in 1950, and for which data were publicly available.

Firm profits for 1955 were analyzed separately and as averages over firms by four-digit industries. Only the latter results are reported.

The relation between the "industry" average of profits after taxes as a per cent of assets and as a per cent of sales and certain industry attributes defined below were estimated using least squares regression. The result

is a single equation linear approximation to a far more complicated relationship. The statistical tests used may be interpreted as approximations only.

Since the Census industries are defined on a nationwide basis, a dispersion index was constructed to take into account the geographic dimension of the relevant market. The industry dispersion index is the sum over the nine Census regions of the absolute difference between the per cent of the United States population in a region and the per cent of value added by manufacturing generated in the same region. The definitions of the remaining variables are self-explanatory:

Z_1 = average over sample firms in an industry group of profits after taxes as a per cent of assets.
Z_2 = average over sample firms in an industry group of profits after taxes as a per cent of sales.
V_1 = industry concentration ratio (four largest firms).
V_2 = industry dispersion index.
V_3 = number of firms in the industry.
V_4 = average over sample firms in an industry group of sales to assets ratio.

The fitted relations (t-ratios in parentheses):

$$Z_1' = \underset{}{5.42} + \underset{(2.46)}{.06158V_1} + \underset{(.03)}{.00036V_2} + \underset{(1.70)}{.00072V_3} - \underset{(-1.82)}{.72991V_4}. \quad R^2 = .30$$

$$Z_2' = \underset{}{4.91} + \underset{(2.53)}{.04365V_1} + \underset{(.18)}{.00168V_2} + \underset{(1.84)}{.00054V_3} - \underset{(-5.40)}{1.4930V_4}. \quad R^2 = .61$$

Only the coefficient of the dispersion index is not significantly different from zero in the predicted direction at the 5 per cent level. One may reject this dispersion index as an appropriate measure of the geographic dimension of the market.

The residuals from the two industry regressions were grouped into eight categories—for example, meat, dairy, and canned fruits and vegetables—and the group means compared. Significant differences between groups were found for both profit rate on assets and profit rate on sales. This may indicate that the model is not properly specified as to form or variables included, or the year chosen simply may be favorable for certain of the groups.

The results obtained apply only to large firms insofar as they are valid at all. How much one may infer about industry performance from knowledge of the performance of its large members remains unanswered.

Whether or not the relations estimated could be used as a guide to the manipulation of the structural variables as a policy measure to attain a desired profit performance is deserving of further investigation. The complicated interactions, only imperfectly described by the model, may lead one to a negative answer.

REPORTS AND MINUTES

ANNUAL REPORT OF THE PRESIDENT

This report will be brief. The work of the Association is described more fully in the reports of the various committees and of the Secretary-Treasurer. And the principal work of the President has already passed in review in the form of the Annual Meetings.

In general, I can report another year of successful operation for the Association. No unusual or particularly difficult problems were encountered by your officers. Both the Winter and Summer Meetings appear to have been successful ventures as measured by such criteria as attendance, publicity and spirited participation. And the Association continues to grow: membership is up about 7 percent over the previous year, and our financial position has improved in all categories.

In planning the Winter and Summer Meetings, your President did not aim for a great number of sessions, or for a maximum number of participants on the program. My goals in planning the programs were exciting sessions, papers of excellent quality and new faces on the program. Only time will permit the judging of the appropriateness of these goals, and the extent to which they were realized. Further, I did not pursue the common practice of arranging sessions by fields of work within the discipline of agricultural economics. In the latter case, I planned sessions around difficult or important problematic situations, and drew program participants from varied and related fields of work. This approach seemed to work well, and merits the consideration of future program planners.

In an effort to provide additional opportunities for new men with new ideas to participate in the Summer Meetings, the Contributed Papers Sessions were made an important part of the total program. The arrangements for these Contributed Papers Sessions were carefully worked out by Aubrey J. Brown, of the University of Kentucky, who served as general chairman of this phase of the program, and the four chairmen of the subject-matter sections: Stanley K. Seaver, James S. Plaxico, Maurice M. Kelso and Lawrence A. Bradford. The success of this phase of the program rests directly on the good work of these men.

Two years ago Harry Trelogan in his Presidential Report said, "Agricultural Economists are willing workers." And this is the way that I have found them to be. All of our committees have worked long and hard this year—with good and tangible results. My two program committees were of great assistance in planning and organizing the programs for the Winter and Summer Meetings. Members of these committees, in consultation with the President, did much of the actual organizational work of specific sessions.

The Awards Committee, under the new management of Leonard F. Miller, did its work with dispatch and in the tradition of good taste and good judgment that we associate with the work of this committee. The work of this committee certainly represents one of the most important activities of our Association, and it is most important that it be done well, as it was this year.

Similarly, the Student Activities Committee, under the new chairmanship of Fred H. Wiegmann, has worked hard and effectively this year. Under Fred Wiegmann's leadership, we now have 37 student sections of the American Farm Economic Association.

The Membership Committee, which was almost completely reconstituted this year under the chairmanship of L. L. Boger, has struck out in new directions, with effective results. The development of a systematic list of potential members based on the graduates of each Department of Agricultural Economics provides a means for regularly enrolling new members in our Association. The Sustaining Membership Committee, too, under the chairmanship of I. W. Duggan, is moving boldly and effectively to increase the number of sustaining memberships in the Association. The membership program of the Association is in the hands of imaginative and hard working people.

Other standing committees of the Association

—Agricultural Data
—Employment
—Investment
—New Orientations in Research

have worked diligently and carried forward the established work of the Association. These committees are the vehicle through which most of the work of the Association is carried on—and the satisfactory way in which this work was carried on made my job as President relatively easy.

I wish to take this opportunity to thank all members of the Executive Committee, the Editor of the *Journal*, his assistants and the Editorial Council for their unselfish work during the past year. Many, many decisions were made by these men during the past year in the conduct of the Association's business affairs. The big decisions were relatively few, but the total flow of business requiring action is greater than one might expect—such that it kept all of these men busy, indeed.

Finally, I wish to express my deep appreciation to Herb Howell and the members of the Local Arrangements Committee at Iowa State University for their untiring efforts in the staging of the Summer Meetings. The cooperation of this committee, together with the effective work of the Economics Staff and their wives, insured the success of the 50th Anniversary Meeting of the American Farm Economic Association at Ames, Iowa.

WILLARD W. COCHRANE
President

REPORT OF THE SECRETARY-TREASURER

Membership

The Association showed growth from 1958 to 1959 in all categories of membership (Table 1). Over all the growth was about seven percent. As of June 30, 1960, 3,617 members' dues and subscriptions were collected. This was only 27 less than the total for 1959 and 137 more than had been received on the corresponding date in 1959.

The fine work of this year's Membership Committee has contributed to a growth in membership which will raise our numbers to the highest yet attained. As expected, the number of new corresponding members is down in 1960 as compared with 1959. Foreign libraries and firms are increasing their subscriptions as Agricultural Economics work expands abroad and as more people trained in the field in this country return to their homes to work.

Cash receipts and expenses

Association cash operating receipts exceeded expenses by $8,304.21 (Net cash income, Table 2). Income, exclusive of the special speaker fund, was

TABLE 1. AMERICAN FARM ECONOMIC ASSOCIATION: MEMBERS AND SUBSCRIBERS, 1959, WITH COMPARISONS

Classification	1957	1958	1959	Increase 1958–59
Sustaining members	—	7	13	6
Regular members	2438*	2423*	2227	114
Junior members	Na	Na	310	
Corresponding members	—	55	146	91
U. S. Libraries and Firms	323	347	359	12
Foreign Libraries and Firms	486	529	572	43
Exchanges	9	17	17	
Total	3256	3378	3644	266
Number of copies of JFE	3310	3442	3739	297
Total membership June 30	3119	3164	3480	

* Includes Junior members

$736.92 more than in 1958-59. Income from subscriptions and dues and from interest and dividends was up. Sales of reprints declined.

Expenditures were $2,473.38 less than a year ago. This reduction came mostly from lower Journal printing and editing costs.

TABLE 2. AMERICAN FARM ECONOMIC ASSOCIATION: CASH RECEIPTS AND DISBURSEMENTS JULY 1, 1959 THROUGH JUNE 30, 1960

Cash on hand July 1, 1959		$ 6,266.16
Current operating—		
Receipts:		
AFEA dues and subscriptions	$31,312.49	
Corresponding member dues	1,819.00	
WFEA dues	665.00	
CAES dues	568.55	
Dividends and interest	3,081.50	
Sale of reprints	2,594.34	
Sale of back issues	1,497.67	
Advertising	178.75	
Annual meetings	1,042.99	
Special fund—foreign guest speaker	2,300.00	
Miscellaneous	149.44	
Total receipts	$45,209.73	
Expenses:		
Journal printing	$23,354.69	
Editing expenses	599.79	
Printing of reprints	2,422.58	
Purchase of back issues	200.25	
Postage and wires	949.27	
Office supplies	749.63	
Sustaining member brochures	309.22	
WFEA & CAES dues remitted	1,239.05	
Membership refunds	315.80	
Annual meeting	1,975.11	
Awards	2,154.70	
Special fund—foreign guest speaker	2,303.13	
Miscellaneous	332.30	
Total expenses	$36,905.52	
Net cash income (receipts minus expenses)		8,304.21
Total		$14,570.37
Advance for 1960 meetings		−1,000.00

Investments:		
Sold:		
40 shares Swift & Co.	$ 1,813.89	
Treasury Bills (July, 1959)	8,000.00	
Treasury Bills (Dec., 1959)[1]	3,000.00	
Total	$12,813.89	
Purchased:		
35 shares Standard Oil, N. J.	1,825.53	
New England Tel. & Tel. Bonds	5,233.40	
U. S. Treasury Bills[1]	4,910.27	
201/300 share Comm. Edison	39.28	
U. S. Treasury Bills[2]	6,812.13	
U. S. Treasury Notes[3]	6,862.10	
Fractional share Chase Manhattan Bank	14.88	
Total	$25,697.59	
Excess of purchases over sales		−12,883.70
Balance in checking account, June 30, 1960		$ 686.67

[1] Treasury bills worth $5,000 purchased Oct; $3,000 for Dec. 15, 1959 maturity; $2,000 for July 15, 1960 maturity.
[2] To mature July 28, 1960.
[3] To mature Nov. 15, 1961.

This year's transactions included the investment of $25,697.59 in long and short term investments. Part of this was a reinvestment of money from the sale of Swift and Company stock, part was new long term investment in corporation bonds and part was short term investment of checking account funds which were in excess of current needs.

Net gain

Our net worth, with all stocks and bonds valued at cost, increased by $9,743.86 (Table 3). In addition to the net cash income of $8,304.21, liabilities for prepaid dues were decreased by $442.90 and there were capital gains amounting to $996.75 which were realized on the Swift and Company stock and the Treasury bills.

TABLE 3. AMERICAN FARM ECONOMIC ASSOCIATION NET GAIN REALIZED DURING YEAR ENDING JUNE 30, 1960

Net cash income		$ 8,304.21
Plus:		
Decrease in prepaid subscriptions and dues	$442.90	
Gain realized on investments	996.75	1,439.65
Net Gain		$ 9,743.86

Balance sheet

Our stock and bond portfolio was increased by $13,880.45. Of this $12,883.70 was investment of new funds, $882.29 was from capital gains realized from the sale of Swift and Company stock and $114.46 from gains on U. S. Treasury bills.

Our liabilities for prepaid Journal subscriptions were reduced to $2,257.20 and represent our only outstanding liability.

TABLE 4. AMERICAN FARM ECONOMIC ASSOCIATION BALANCE SHEET, JUNE 30, 1960

ASSETS		
Cash		$ 686.67
Advance, 1960 meetings		1,000.00
Investments (at cost)		
Treasury bills	$ 8,722.40	
Treasury notes	6,862.10	
Treasury bonds	24,045.54	
Corporation bonds	6,205.21	
Stocks	26,931.41	
Total investments		$72,766.66
		$74,453.33
LIABILITIES AND NET WORTH		
Deferred credit		
Prepaid membership dues[1]		$ 2,257.20
Net worth		
Balance June 30, 1959	$62,452.27	
Net gain realized during year	9,743.86	
Net worth June 30, 1960		72,196.13
		$74,453.33

[1] Dues and subscriptions for 1961 and 1962.

Summary

This report is favorable. Highlights are:

1. Membership continues to grow.
2. Increased income and reduced expenses gave us a net cash income of $8,304.21.
3. Reduced liabilities and realized investment gains increased our net worth, with all investments inventoried at cost, by $9,742.86. The net worth at the close of the year was $72,178.13.
4. With all assets valued at the market price, the Association's Net Worth was $114,291.37 at the end of the year.

This has again been an enjoyable year for the Secretary-Treasurer. Contacts with many of you have been enjoyable and it is my hope that you are reasonably well satisfied with the functioning of the office. One bit of assistance you could render me during the coming year is more prompt payment of your dues. This would reduce my problems, lower Association operating costs and be appreciated.

C. D. KEARL
Secretary-Treasurer

ADDENDUM AMERICAN FARM ECONOMIC ASSOCIATION: 1960–61 BUDGET[1]

Receipts:		
AFEA dues and subscriptions	$29,420	
Corresponding members	1,200	
Sustaining members	1,000	
Sale of back issues	1,500	
Sale of reprints	2,600	
Advertising	200	
Annual meeting (winter)	370	
Interest and dividends	3,600	
Miscellaneous	150	
Total receipts		$40,040
Expenses:		
Journal printing	$26,500	
Editing fees	2,000	
Printing of reprints	2,500	
Purchase of back issues	200	
Awards program	2,165	
Annual meeting expense	1,665	
Postage and telegrams	1,000	
Office supplies	600	
Subscription refunds and misc.	350	
Sustaining member brochure	—	
Handbook preparation	2,750	
Total expenses		39,730
Budgeted gain		$ 310

[1] As adopted by Executive Committee, August 12, 1960.

REPORT OF AUDITING COMMITTEE

At the request of the officers of the Association, we have examined the accounts, records and statements prepared by the Secretary-Treasurer, Dr. C. Del Mar Kearl for the year ended June 30, 1960.

The statements prepared by the Secretary-Treasurer accurately reflect the financial operation of the Association and its financial condition as of the end of the fiscal year to the best of our knowledge and belief.

We compared the cash receipts ledger totals with the totals for the various income categories, the deposit totals in the checkbook and bank statements, and the totals in the cash receipts section of the annual statement prepared by the Secretary-Treasurer. We found them to be completely and accurately recorded and reported. We also compared a sample of the individual membership receipts entries with the membership card file and found them accurately recorded.

We verified the disbursements against the vouchers, canceled checks and bank statements. We compared the totals of the various categories of disbursements with the grand total in the cash disbursements ledger and with the expenditures reported in the annual statement. We found them to be correctly recorded and reported.

We reconciled the bank balance as of June 30, 1960, with the checkbook balance.

We inspected the securities kept at the Tompkins County Trust Company, Ithaca, New York. We verified them against the securities ledger and the list

submitted by the Secretary-Treasurer. We found them to be completely and accurately reported.

We congratulate the Secretary-Treasurer and his assistants for the excellent manner in which the records have been kept this past year.

K. S. CARPENTER, *Chairman*
Auditing Committee

REPORT OF TELLERS COMMITTEE

The count of the ballots showed the following officers elected for 1960-61:

President-Elect ..... Bushrod W. Allin
Vice-Presidents ..... Lawrence L. Boger
Robert L. Clodius

C. W. PIERCE, *Chairman*
Tellers Committee

REPORT OF THE EDITOR

In my first year as Editor of the *Journal of Farm Economics,* I have found the job both interesting and rewarding—and also continuously time consuming. Nearly 200 contributed manuscripts have been received. Of these, 24 are currently in the hands of reviewers. Of the remainder, three were withdrawn by the authors and 75 either were rejected or were returned to the authors with suggestions for substantial revision, and have not so far come back. Through the August issue, 73 have appeared in the *Journal,* 34 as major articles, 39 as notes. Another 17 have been accepted for future publication, subject to minor further editing or revision.

In addition to the contributed manuscripts, 60 major papers presented at our annual and winter meetings were edited and published in the December and May issues, plus 39 discussion papers.

You will note that I have lumped together the manuscripts rejected with those returned with suggestions for substantial revision. One of the personally rewarding—but also most time-consuming—activities of the Editor is trying to help authors improve manuscripts that report substantial research contributions, or that contain imaginative ideas potentially worthy of publication, but that are badly written, or are otherwise not suitably presented for use in the *Journal.*

Many of these are attempts of younger authors to publish results of their doctoral researches. Their problem is aptly put in a comment by a reviewer of one such manuscript:

> I don't believe that the author is fully reconciled to the differences between a (say) 200 page thesis in which you demonstrate your scholarship, data knowledge, etc., to your examining committee, and a journal article in which you suggest these in more limited and subtle ways and try to make a limited number of points.

Boiling down a Ph.D. dissertation to an article—or, worse yet, sometimes only a note—is severely painful to an author, but many of our better contributions are born from this agony.

Here I want to express appreciation, both personally and on behalf of the Association, to the members of the Editorial Council and to the numerous other individuals who have reviewed and appraised manuscripts and have taken the time to give helpful comments and criticisms to the authors. I had intended to include in my report a list of all such persons, but when I came to count them up I found that there were well over a hundred of them. They shall, therefore, remain anonymous; but my heartfelt thanks to them for their substantial help.

I should like to express appreciation also to another group of persons who make an important though anonymous contribution to the *Journal*—those who send in from our many institutions the information that appears in the News Notes. I suspect that this is one of the most generally read sections of the *Journal.* However much our specialized interests may limit our reading of the technical articles in the *Journal,* all of us are interested in keeping track of our friends in the Association. A vote of thanks, therefore, to our News Notes reporters, who make this possible.

My particular thanks, also, to my Associate Editor, R. H. McAlexander, who has shared heavily in the task of handling and evaluating manuscripts, and to our Book Review Editor, C. O. McCorkle, who has taken substantially autonomous responsibility for the Publications and Reviews sections of the *Journal.*

We have made no innovations in the *Journal* this year—getting onto the sheer running of it has been a sufficient task. We have tried, however, to keep it broadly reflective of the varied interests of the profession. We welcome suggestions from the members, either directly or via the Editorial Council, one of whose important functions is to advise the Editor on ways to make the *Journal* serve more adequately the needs of the Association. This will continue to be our aim.

HERMAN M. SOUTHWORTH
Editor

REPORT OF THE AWARDS COMMITTEE

One important change was made in the Awards Program of the Association for 1960. The awards for papers contributed by graduate students were dropped, and in their place, awards were established for masters' theses. The fine response to this change suggests it was well received by the membership and should be continued as a regular part of the Awards Program. The committee which handled the undergraduate debate and public speaking contests also was in charge of the new masters' theses program. This is too heavy a load for one committee, however, and it is recommended that these responsibilities be handled by two separate committees in the future. Also, for the first time, certificates will be awarded to the winners of the undergraduate public speaking and debate contests and to the schools they represent.

Names of the chairmen and members of the subcommittees appear elsewhere in these reports. In judging the quality of the numerous entries in the Awards Program, these individuals have contributed far more in time and energy than most people appreciate. They deserve the strongest commendation for their contribution to the Association.

Participation in the contest and the judges' selections, listed in alphabetical order, were as follows:

Awards for M.S. Theses

M.S. Theses were received from eighteen institutions for consideration for the M.S. Theses Awards. Contest rules limit each department to one entry. The theses selected for Awards Certificates and checks for $100 each were:

C. D. COVEY, "Some Considerations Affecting Producer Equity in the Florida Flue-Cured Tobacco Program," The University of Florida.

R. R. EHRICH, "An Economic Analysis of Cash-Future Price Relationships of Hard Red Spring Wheat," The University of Minnesota.

E. B. LERNER, "An Econometric Analysis of the Demand for Pecans with Special Reference to the Demand Inter-Relationships Among Domestic Tree Nuts," Oklahoma State University.

In addition, the Subcommittee has recommended for Honorable Mention:

FRED NORDHAUSER, "A Statistical Estimate of the Short-Run Price Elasticity of Demand for Fryers," Purdue University.

Awards for Ph.D. Theses

Ph.D. Theses were submitted from fourteen different institutions. In all, seventeen theses were submitted, since a department may enter one thesis for each eight degrees, or fraction thereof, awarded in 1959. The following were selected for Awards Certificates and checks for $250 each:

CARELTON C. DENNIS, "Interregional Competition in the Frozen Strawberry Industry," The University of California.

JOHN L. DILLON, "An Empirical Comparison of Theoretical and Actual Decision Making Under Uncertainty," Iowa State University.

JOHN R. MOORE, "Market Structure and Competitive Behavior in the Dairy Industry," The University of Wisconsin.

In addition, the Subcommittee has recommended for Honorable Mention:

PAUL R. JOHNSON, "Land Substitutes and Changes in Corn Yields," The University of Chicago.

J. A. SCHONEMAN, "Effect of Variety and Harvest Date Systems on Economic Returns for Potato Farms in Central Wisconsin," The University of Wisconsin.

Awards for Published Research

Thirty publications were evaluated by the Subcommittee for Published Research. The publications selected for Awards Certificates and checks for $250 each were:

RICHARD A. ANDREWS, "A Study of the Sweet Corn Industry in the Midwest Farm Economy," published by the University of Minnesota Agricultural Experiment Station, St. Paul, Minnesota. Submitted in the General Agricultural Economics classification.

JAMES F. HUDSON, "Pricing Cotton Seed for Crushing," published by the Louisiana State University Agricultural Experiment Station, Baton Rouge, Louisiana. Submitted in the Agricultural Prices classification.

WALTER G. MILLER, "Comparative Efficiency of Farm Tenure Classes in the Combination of Resources," published by the USDA, ARS, Farm Economics Research Division. Submitted in the field of Land and Water Economics and Conservation.

Award for Best Article in JOURNAL OF FARM ECONOMICS

The Editors and the Editorial Council performed the task of selecting the best article published in our *Journal* during 1959. From among the many excellent articles, the one chosen for the award of $250 was:

JOHN M. BREWSTER, "The Impact of Technical Advance and Migration on Agricultural Society and Policy," December (Proceedings) issue (Vol. XLI, No. 5), pages 1169-1184.

Four hundred and fifty copies of the 1960 Awards Announcement were distributed in October, 1959. A follow-up letter encouraging participation was mailed in January, 1960. The announcement, which included a list of the judges along with the regulations and procedures to be followed, was printed in the February, 1960 issue of this *Journal*.

LEONARD F. MILLER, *Chairman*
Awards Committee

REPORT OF THE STUDENT ACTIVITIES COMMITTEE

Masters' Theses Competition

The student affairs committee was charged with the responsibility for selecting the three best M.S. theses submitted during 1959. (This competition replaced "Graduate Students Contributed Papers" which had been in effect since 1956.) The results of this competition are stated in the "Report of the Awards Committee," above.

In view of the interest and degree of participation in the first year this committee feels the M.S. Thesis competition will prove increasingly stimulating and worth while. In changing from papers to theses the suggestion was made last year that the responsibility for the M.S. theses be given to a separate committee after the first year. The Student Activities Committee heartily endorses this suggestion. We feel the new program has been eminently successful but together with the regular work in connection with undergraduate student affairs, is too much for one committee.

Undergraduate Student Contests

Nine institutions indicated intentions of entering debate teams this year. Due to unavoidable circumstances three dropped out by August 1st. Those remaining were: University of Houston, Kansas State University, University of Minnesota, Ohio State University, Oklahoma State University, and Purdue University. Thirteen institutions indicated intention to have entries in the public speaking contest, in some cases more than one from one school. These included Auburn University, University of Houston, University of Illinois, Iowa State University, Kansas State University, Michigan State University, University of Minnesota, Mississippi State University, University of Nebraska, North Carolina State College, Ohio State University, Oklahoma State University and Pennsylvania State University. Actual participation will not be known until contest time in either case since over the years it has generally been either more or less than indicated "intentions."

The debate topic this year is: "Resolved, that the major agricultural price and production control policies of the Federal Government have not been in the best interest of American Agriculture." Public speaking topics are on any subject chosen by the speaker in an area of interest to Agricultural Economics.

Only one debate team can be entered by one institution but more than one speaker is permitted. A student cannot participate in both speaking and debating. This year two sets of debates are being conducted simultaneously to avoid taking too much time of the judges and others officiating at the contests.

The committee has recommended that Certificates of Merit be presented winning participants and their institutions, in addition to the usual personal awards to the winners. Certificates of Merit will be presented this year. It is felt that this type of award will enhance the prestige of the contests. The committee recommends that these awards be continued. The committee will discontinue presenting token awards to all participants this year.

It was apparent this year, as in the past, that more than eight debate teams will present a problem. With two debates running simultaneously it is possible to handle eight teams in the time allotted this year. With more than eight teams more time would be needed. Should debate activity expand very much this problem will need some study. Since much less time is needed for public speaking this does not present a time problem.

Student Sections

We now have 37 chartered student affiliate sections of the American Farm Economics Association. They are listed below:

1. Ohio State University
2. University of Tennessee
3. North Carolina State College
4. Alabama Polytechnic Institute
5. University of Florida
6. Mississippi State College
7. Virginia Polytechnic Institute
8. Louisiana State University
9. Iowa State University
10. Kansas State University
11. Michigan State University
12. University of Nebraska
13. Oklahoma State University
14. Texas A. & M. College
15. University of Kentucky
16. University of Arkansas
17. Clemson Agricultural College
18. University of Missouri
19. Pennsylvania State University
20. University of Utah
21. Rutgers University
22. South Dakota State College
23. University of Wisconsin
24. Purdue University
25. University of Illinois
26. University of Massachusetts
27. University of Georgia
28. North Dakota State College
29. University of Maryland
30. Ontario Agricultural College
31. New Mexico College of A. & M.A.
32. University of Minnesota
33. Texas Technological College
34. Southern Illinois University
35. University of Houston
36. MacDonald College
37. Montana State College

Student Officers

National officers for the student section during the past year were:

President .....Robert Harris, Ohio State University
Vice President .....Swen Anderson, University of Minnesota
Secretary-Treasurer ...Phoebe Greenleaf, Pennsylvania State University
Editor .....Donald Epp, University of Nebraska

New officers for the coming year will be elected at this meeting.

Student Newsletter

The student section publishes a newsletter reporting activities of the various chapters three times each year.

Finances

The American Farm Economic Association advances $75 each year to defray the cost of the student newsletter. A similar amount is made available to

purchase personal awards for winners in the speaking and debate contests. It is recommended that these allocations be continued.

FRED H. WIEGMANN, *Chairman*
Student Activities Committee

REPORT OF THE AGRICULTURAL DATA COMMITTEE

The Agricultural Data Committee of the American Farm Economic Association has completed five years of work. The Committee was appointed in 1955 after a recommendation that it be established was made in 1954. The first meeting of the Committee was held at Washington in the spring of 1955. The data problems which brought the establishment of the Committee were largely associated with Agriculture Extension work and the needs in this area were among the first to be examined by the Committee. Three subcommittees were established:

1. Agricultural Data Needs in Extension Work, D. D. Brown, Chairman.
2. Data Requirements for Livestock, Outlook and Marketing, J. Carroll Bottum, Chairman.
3. Agricultural Data Needs for Research, K. L. Bachman, Chairman.

As a result of the efforts of these subcommittees a series of five sets of reports and papers have been presented at the annual meetings of the Association for the years 1955 through 1959. These papers summarized much of the work done by the Committee and its Subcommittees.

A special report was made by the Committee to the U. S. Department of Agriculture and the U. S. Census Bureau in January of 1957. This report did several things:

1. It reviewed certain areas in which agricultural data problems were reported, and recommended steps that might be taken to improve the situation.
2. It reported on a special survey showing trends in new data requirements.
3. It listed specific items of data that respondents in various states said they needed.

This report was also one of the exhibits used by the U. S. Department of Agriculture in an appeal to a Committee of Congress for more funds to provide an enlarged statistical program in the Department.

During the past year there have been two meetings of the Committee, one at Cornell University, August 25, 1959, and one at Washington, D.C., December 29, 1959. At the December meeting it was suggested that another panel of papers growing out of the Committee's work should be offered at the annual meeting in 1960, but it was not possible to get space on the program this year, hence this was not done.

Another area of work which had the attention of the Committee was a request from a subcommittee of the American Society of Agronomy. This group made a detailed statement regarding the need for a census of grazing lands in the United States, and it included a proposed program for the collection of basic field data on the production of grazing lands as expressed in terms of livestock support.

This proposal was presented to the Committee in some detail at the December 29 meeting. However, it was decided that while the subject was an important one and certainly worthy of study, no methodology exists at the present

time by which this task can be accomplished. The methods of the United States Census as well as those of the United States Department of Agriculture are not at present capable of undertaking this vast problem. In fact, a frontal attack on it at present is not feasible because of: (1) the lack of resources for such a big undertaking, and (2) the need to develop satisfactory methodology by which the work can be done. The undertaking will probably need to await the developing of methods by which the facts desired can be ascertained as well as the provision of adequate resources to undertake so large a task. The view was transmitted to Dr. Howard B. Sprague of the Department of Agronomy of Pennsylvania State University, who is the Chairman of the Agronomy Society's subcommittee.

At the meeting of the Committee at Cornell on August 25, 1959, the Chairman and the Secretary were authorized to arrange a conference with the Budget Bureau and the Office of the Secretary of Agriculture in order to assist in the task of obtaining additional funds to strengthen the Agricultural Statistics work in the U. S. Department of Agriculture. Various groups have been interested in this for several years. As a result of this action, Dr. Doris D. Brown and K. E. Miller of this Committee conferred with officials of the Budget Bureau and with Undersecretary True Morse, of the Department.

It is gratifying to report that in the current budget the Agriculture Estimates Division of the Department has received an increase of $750,000 in its funds in order to strengthen this basic work.

Your Chairman has continued to serve on the Advisory Committee for the United States Census of Agriculture and on the Census Population Council. The agricultural census of 1959 was completed in good time and data from it are already available for various states.

WALTER H. EBLING, *Chairman*
Agricultural Data Committee

REPORT OF THE RESOLUTIONS COMMITTEE

1. The American Farm Economic Association, as it enters its second half century, expresses sincere appreciation to Iowa State University both for the excellent arrangements at this meeting and the important contributions of this great University to the profession during the last half century. Special thanks are due members of the Department of Economics and Sociology, as well as members of the overall planning committee, Herb Howell, Dick Phillips, Ray Beneke, and Karl Fox, whose meticulous care has assured everyone of an enjoyable meeting, and whose hospitality has reached not only members but their families.

2. The Association is mindful that the successful year just completed resulted from the outstanding work of President Cochrane, other officers, and the special committees who have so effectively conducted the work of the Association.

3. BE IT RESOLVED, therefore, that these resolutions be placed in the records of this meeting and that the Secretary of the Association be instructed to transmit them to the above individuals and groups.

C. E. FRENCH, *Chairman*
Resolutions Committee

MINUTES OF THE MEETINGS OF THE 1959-60 EXECUTIVE COMMITTEE

WASHINGTON, D.C., DECEMBER 27-29, 1959

Present: Cochrane, Trelogan, Nicholls, Hardin, Southworth, Haviland, Koffsky, Allin, Duggan, Fox, Kearl.

1. Minutes of Executive Committee Meeting of August 23 and 24, 1959, were approved.

2. Sustaining Members Committee report was presented by Duggan. Trelogan discussed a letter and material for a brochure to be prepared and sent to companies to invite them to become sustaining members. The committee was authorized to prepare and publish such a brochure.

3. Kearl discussed the AFEA current financial situation and the activities of the Investment Committee. Hardin moved that the Executive Committee endorse the financial operations of past period and concur with recommendation of Secretary-Treasurer that surplus funds be invested by him upon consultation with the Investment Committee. Passed.

4. Hardin moved that the Secretary be authorized to purchase furniture and equipment as needed in conduct of his office. Passed.

5. Cochrane moved adoption of blue paper (similar to the JFE cover) for AFEA printing, forms and envelopes. Passed.

6. A request by the Johnson Reprint Corporation to reprint unavailable issues of the JFE was considered. Permission is to be granted to Johnson Reprint Corporation to publish unavailable issues from the beginning through 1959, but we are to inform the Company that we do acquire and resell back issues of the JFE, and further that we have no copyright covering *Journals* published during this period.

7. Southworth was instructed to inquire into the copyright rules, regulations and our needs as related to JFE.

8. Southworth was instructed to consider the AFEA policies concerning reprinting of *Journal* articles.

9. Need to include an announcement of program of Institute of International Education in the JFE was discussed. The decision was left to the Editor.

10. A membership report was presented by the Secretary.

11. Allin reported on preparation for winter meetings.

12. Koffsky reported for the special committee on Joint Membership Arrangements with Foreign Societies and moved that report be accepted. Approved.

13. Fox reported on the plans and arrangements for the Annual Meetings to be held at Iowa State University, Ames, Iowa.

14. Cochrane reported on program arrangements for the August 1960 meeting.

15. Hardin presented plans for producing a directory for the American Farm Economic Association. Trelogan moved the report be accepted and the committee be authorized to move forward in the preparation for publishing the directory.

16. Trelogan reported on the ICA membership program. We are likely to receive recommendations for corresponding members from ICA at the rate of 20 to 24 per year in the future.

17. Trelogan reported on the site of the 1962 Annual Meeting. The Depart-

ment of Agricultural Economics at the University of Maryland is not able to act as the host. Cochrane moved that we should inquire of the New England Agricultural and Economic Council whether the invitation still stands and accept if conditions seem desirable. Passed.

18. Trelogan proposed that Purdue be considered as a possible alternate. Passed.

19. Cochrane moved that the partial list of members prepared by Bressler not be published as the list of charter members. Passed. This list is to be printed in the directory issue of the JFE stating the definition of a charter member and the steps which were taken in preparing the list.

20. Nominees were selected for Fellows of the American Farm Economic Association.

21. Cochrane reported that O. C. Stine had been appointed to the Fellows Nominating Committee. Because Hobson is unable to serve, it was proposed that Black be moved up as chairman of the Fellows Nominating Committee and a new member be selected by Cochrane. Passed.

22. The Asher Hobson collection of books which he wishes to give to the AFEA was discussed. Cochrane was authorized to contact Hobson and indicate that the Executive Committee does not feel that AFEA is a suitable organization to receive the books but we would be willing to help with alternatives if advice is desired.

23. The Kutish case was discussed. The President was authorized to dismiss the matter without action by the Association.

24. Policies of the editor in handling and reviewing manuscripts for the JFE were discussed.

25. Cumulative Index Committee recommended that a cumulative index of the JFE be prepared picking up where the last one left off, and that a committee of six be appointed to plan and carry out the details of the preparations and publication. Hardin moved that the new Executive Committee receive a report by the committee in August 1960 after considering the American Economic Association index which is being prepared and other pertinent matters.

AMES, IOWA, AUGUST 10 AND 12, 1960

Meeting called to order by President Cochrane 9:05 A.M., August 10, 1960.
Present: Members: Cochrane, Trelogan, Nicholls, Koffsky, Kearl
Ex-officio members: Working, Boucher
Guests: Allin, Boger, Southworth, Duggan, Howell, Ackerman, Miller, Beneke, Wiegmann, Ebling

1. Cochrane announced election of Bushrod Allin, President-elect; Lawrence Boger, Vice-President; and Robert Clodius, Vice-President.

2. Trelogan moved the adoption of minutes of Executive Meetings, December 27-29, 1959. Passed.

3. Kearl presented a report of activities of the office of Secretary-Treasurer. Trelogan moved the approval of the report for presentation at the annual business meeting. Passed.

4. It was reaffirmed that the President is authorized to pay expenses for two speakers outside the Association to participate in the annual meetings. If anticipated expenses to obtain speakers from other disciplines may be unusually large prior approval of the Executive Committee should be sought.

5. Kearl presented the report of the Audit Committee for K. S. Carpenter, chairman. Trelogan moved approval for presentation at the annual business

meeting. Passed. It was suggested that the President should appoint an Audit Committee to arrange for an outside audit in 1961 as per the policy adopted by the Association.

6. The organization of Awards and Student Activities Committee was discussed. It was recommended that the President have two separate committees:
   1. Student Activities Committee for undergraduate activities of clubs, debates, public speaking, etc.
   2. Awards Committee for graduate students awards including Masters' theses, Ph.D. dissertations, the *Journal* article award, and published reports.

7. Wiegmann reported on the activities of the Student Activities Committee. Trelogan moved acceptance with commendation. Passed.

8. Boger reported on the activities of the Membership Committee. Trelogan moved the acceptance of the report with commendation, and recommended that the report be turned over to the new Membership Committee for its consideration. Passed. The Membership Committee's responsibility is to expand the membership among the profession. To further this objective Boger recommended among other things that:
   1. A welcome letter from the President be sent to all new members.
   2. A letter acknowledging payment of dues and urging activity in affairs of the Association be sent to all members.
   3. A follow-up be made on the potential membership list.

9. Duggan reported on the activities of the Sustaining Membership Committee.

10. Ebling reported the work of the Agricultural Data Committee. Trelogan moved acceptance of the report and that acknowledgement of it be made at the annual business meeting. Passed.

11. Southworth reported on the activities of the office of the Editor. It was suggested that the editor be authorized to use some invited papers on particular subjects. The New Orientations in Research Committee is arranging for some papers of this character to be presented to the *Journal*. The suggestion was endorsed with the understanding that the papers must measure up to the editorial requirements of the *Journal*.

12. The editor suggested that a Proceedings Editor be appointed. Trelogan moved that the President be authorized to appoint a Proceedings Editor. Passed.

13. Southworth and Kearl reported on the arrangements with the Johnson Reprint Corporation regarding the publishing of back issues of JFE.

14. Southworth reported on copyrighting of the JFE. This can be done reasonably but there are no strong arguments for or against such action. No action was taken to copyright the JFE.

15. Southworth proposed the Association have as its policy the encouragement of others to reprint articles from the JFE providing appropriate acknowledgement be given. This policy was endorsed.

16. Ackerman reported on the activities of the Investment Committee. Trelogan moved the acceptance of the report. Passed.

17. Howell reported on the activities of the Local Arrangements Committee. He indicated that there were fewer families than expected, with a consequent high cost per family for their activities.

18. Cochrane discussed the problems connected with the election of Fellows and suggested:
   1. that one of the vice presidents be given the responsibility of working with the Fellows Election Committee, and

2. that an election procedure should be adopted to be followed by the Fellows Election Committee.

A consensus on these suggestions was not reached and it was agreed that Cochrane will propose a procedure at the December Executive Committee meetings for further consideration.

19. Miller reported the activities of the Awards Committee. Nicholls moved the acceptance of the report. Passed.

20. Beneke reported the activities of the Employment Committee. There are about 50 jobs listed and 50 applicants in the employment office at this meeting. It was suggested that the policy of the Committee activities being limited to the annual meetings be continued. Nicholls moved the acceptance of the report. Passed.

21. Kearl reported the activities of the Directory Committee. Forms for obtaining biographical sketches were discussed. Costs estimated at $2,500 for clerical help and $250 for printing and postage would be met in this year's budget. Printing at a rate of $6,232 for 4,000 copies plus $27.81 per 100 additional copies would be met in next year's budget possibly using some of the short term investments. The time table would be approximately: mailing of questionnaires, September 1960; final date for receiving questionnaires, April 1, 1961; all material to be in the hands of the printer, June 1, 1961; publication to be as Part II, Number 4, Volume XLIII, November 1961.

22. Meeting suspended, 6:30 P.M.

23. Meeting resumed 8:15 P.M., August 12, 1960.

24. Trelogan moved that the directory be given to all paid up members in 1961 and all others be charged $5.00 per copy. Passed.

25. Koffsky moved that 6,000 copies of the directory be printed. Passed.

26. Southworth reported that a quotation from Banta has been obtained for publishing a cumulative index. The printing will cost $3500–$4000 for 5000 copies. The editor is to get estimates of the cost of preparing such an index.

27. Southworth and Kearl reported on the Banta Publishing Company contract negotiation. Inquiries have been made of six publishers of this kind of material. Four quotations were obtained. Southworth indicated that it was his opinion that the Banta contract was preferable. Trelogan moved that the Banta contract be accepted. Passed.

28. Cochrane discussed the problem of committee expenditures. Nicholls moved that the Executive Committee reaffirm the long standing policy of the Association that prior approval of the Executive Committee or the President must be obtained before expenditures made by committees of the Association can be obligated against the AFEA treasury. Passed.

29. Cochrane raised the question of separating the membership dues and the JFE subscription to the members. It was decided to continue the present policy.

30. Consideration was given to the proposal that the Association should support the re-establishment of the Bureau of Agricultural Economics. It was decided to postpone action until the December executive meeting in view of the lack of a clearly desirable policy.

31. Trelogan raised the question of the present condition of the Awards Program. It was decided to continue it as it is for the present.

32. Trelogan raised the question of an emeritus membership for those who have been members of many years. It was decided not to establish such a membership.

33. Trelogan discussed the need of an archivist for collecting, preserving and

indexing Association correspondence and records. Clodius is to contact Carstensen to see if he will undertake the job and report at the December Executive Committee meeting.

34. Trelogan raised the question of the Association preparing a brochure on careers in Agricultural Economics. No action was taken.

35. Southworth reported activities of the New Orientations in Research Committee. It is arranging for several papers to be prepared for the JFE as mentioned previously and consideration is being given to the development of a standard classification for agricultural economics published material.

36. Meeting adjourned.

MINUTES OF THE MEETING OF THE 1960-61 EXECUTIVE COMMITTEE

AMES, IOWA, AUGUST 12, 1960

Meeting called to order by President Nicholls, 9:45 P.M.

Present: Members: Nicholls, Cochrane, Allin, Boger, Clodius, Kearl
Ex-officio member: Boucher
Guests: Luttrell, Rehnberg, Goetch, Seltzer, Southworth.

1. Luttrell reported on the arrangements for the St. Louis winter meetings. Meetings will be at the Chase-Park Plaza Hotel.

2. Rehnberg reported on the arrangements and plans for the 1961 annual meetings at Fort Collins.

3. The 1962 Annual meetings will be at Storrs, Connecticut, August 19-22.

4. Cochrane moved that K. S. Carpenter be authorized to serve as Secretary-Treasurer in the absence of Kearl during the Fall semester, 1960-61. Passed.

5. Nicholls will ask Frank Maier of USDA to act as the AFEA representative at a meeting, if called, to consider job classifications within agriculture.

6. Nicholls indicated that invitations for the 1963 Association meetings have been received from Ohio State University, University of Minnesota, and Purdue University. Cochrane moved that the 1963 meetings be held at the University of Minnesota. Passed.

7. Boger moved the adoption of the budget. Passed.

8. Adjourned 11:55 P.M.

MINUTES OF THE ANNUAL BUSINESS MEETING
AMES, IOWA, AUGUST 13, 1960

1. The meeting was called to order by President Willard Cochrane at 8:40 A.M.

2. The President reported on the condition and activities of the Association. No unusual problems have occurred during the year.

3. The report of the Secretary-Treasurer, presented by C. D. Kearl, was accepted.

4. The report of the Auditing Committee was presented and accepted.

5. A brief report was given on the publication of a new Handbook, to be Part 2, No. 4, Vol. XLIII, November 1961, of the *Journal of Farm Economics*.

6. The report of the Editor was presented by Herman Southworth.

7. The report of the Employment Committee was presented by Raymond Beneke.

8. Willard W. Cochrane turned the meeting over to the new President, William H. Nicholls.

9. President Nicholls requested that those present stand in silent tribute to the memory of Dr. John D. Black.

10. Future meetings of the Association were announced as follows: Winter meeting, St. Louis, December 28-30, 1960; Summer meeting, Colorado State University, Fort Collins, Colorado, August 14-16, 1961.

11. The report of the Resolutions Committee presented by Charles French, was accepted.

12. H. C. M. Case suggested that consideration be given to the expenditure of the earnings of our investments in line with the original intent in accumulating the investments, i.e., clerical assistance for the Secretary-Treasurer and Editor.

13. The meeting was adjourned at 9:30 A.M.

C. D. KEARL
Secretary-Treasurer

COMMITTEES OF THE AMERICAN FARM ECONOMIC ASSOCIATION, 1959-60

Executive Committee

President	W. W. Cochrane, University of Minnesota
President-Elect	W. H. Nicholls, Vanderbilt University
Vice-President	L. S. Hardin, Purdue University
Vice-President	N. M. Koffsky, Agricultural Marketing Service, U.S.D.A.
Secretary-Treasurer	C. D. Kearl, Cornell University
Past President	R. G. Bressler, University of California
Past President	H. C. Trelogan, Agricultural Marketing Service, U.S.D.A.

Ex-officio Members:

W. E. Haviland, President, Canadian Agricultural Economics Society
E. J. Working, President, Western Farm Economics Association

Journal of Farm Economics

Editor	H. M. Southworth, Pennsylvania State University
Associate Editor	R. H. McAlexander, Pennsylvania State University
Book Review Editor	C. O. McCorkle, Jr., University of California

Editorial Council:

M. E. Andal, Canada Department of Agriculture
J. N. Boles, University of California
J. P. Cavin, Agricultural Marketing Service, U.S.D.A.
A. Erikson, Oscar Mayer Company
D. E. Hathaway, Michigan State University
R. J. Penn, University of Wisconsin
R. W. Rudd, University of Kentucky

R. C. Scott, Federal Extension Service, U.S.D.A.
O. J. Scoville, Agricultural Research Service, U.S.D.A.
B. F. Stanton, Cornell University
H. A. Steele, Agricultural Research Service, U.S.D.A.
E. R. Swanson, University of Illinois

Awards Committee

L. F. Miller, Oklahoma State University (General Chairman)

Subcommittee I—Published Research:

J. C. Bottum, Purdue University (Chairman)
E. T. Baughman, Federal Reserve Bank of Chicago
H. F. Breimyer, Agricultural Marketing Service, U.S.D.A.
G. K. Brinegar, University of Connecticut
M. Clawson, Resources for the Future, Inc.
D. B. DeLoach, University of California
H. R. Jensen, University of Minnesota
D. R. Kaldor, Iowa State University
R. J. Penn, University of Wisconsin
M. D. Woodin, Louisiana State University

Subcommittee II—Doctoral Dissertations:

G. G. Judge, Oklahoma State University (Chairman)
N. R. Collins, University of California
R. W. Rudd, University of Kentucky
S. D. Staniforth, University of Wisconsin

Subcommittee III—Student Activities:

F. H. Wiegmann, Louisiana State University (Chairman)
J. C. Gilson, University of Manitoba
H. W. Halvorson, University of Wisconsin
John Sjo, Kansas State University
W. D. Toussaint, North Carolina State College

Committee of Fellows

T. W. Schultz, University of Chicago (Chairman)
M. J. Ezekiel, Food and Agriculture Organization
O. B. Jesness, University of Minnesota
W. I. Myers, Cornell University
O. C. Stine, Shepherdstown, West Virginia

Employment Committee

R. D. Aplin, Cornell University (Chairman)
R. R. Beneke, Iowa State University
I. F. Davis, Colorado State University
D. B. DeLoach, University of California
L. F. Herrmann, Agricultural Marketing Service, U.S.D.A.
R. A. Murray, University of Maryland

Agricultural Data Committee

W. H. Ebling, University of Wisconsin (Chairman)
K. L. Bachman, Agricultural Research Service, U.S.D.A.

F. V. Beck, Rutgers University
J. C. Bottum, Purdue University
D. D. Brown, Skaneateles, New York
G. G. Judge, Oklahoma State University
K. E. Miller, Armour and Co.
P. M. Raup, University of Minnesota
R. W. Rudd, University of Kentucky
R. E. Seltzer, University of Arizona
R. L. Tontz, Foreign Agricultural Service, U.S.D.A.

Investment Committee

J. Ackerman, Farm Foundation (Chairman)
E. T. Baughman, Federal Reserve Bank of Chicago
A. C. Hoffman, Kraft Foods, Inc.
C. D. Kearl, Cornell University
W. I. Myers, Cornell University

Membership Committee

L. L. Boger, Michigan State University (Chairman)
C. D. Kearl, Cornell University
R. E. Olson, Agricultural Marketing Service, U.S.D.A.
O. M. Ray, American Feed Manufacturers Association
O. J. Scoville, Agricultural Research Service, U.S.D.A.
T. R. Timm, Texas A. & M. College

Sustaining Membership Committee

I. W. Duggan, Trust Company of Georgia (Chairman)
P. E. Jones, U.S. Beet Sugar Association (Vice-Chairman)

Program Committee—1959 Winter Meeting

W. W. Cochrane, University of Minnesota (Chairman)
B. W. Allin, Agricultural Marketing Service, U.S.D.A.
G. E. Brandow, Pennsylvania State University
W. F. Finner, Agricultural Marketing Service, U.S.D.A.
P. E. Jones, U.S. Beet Sugar Association
M. L. Nerlove, Stanford University
T. W. Schultz, University of Chicago
B. R. Stauber, Agricultural Marketing Service, U.S.D.A.

Program Committee—1960 Annual Meeting

W. W. Cochrane, University of Minnesota (Chairman)
S. O. Berg, University of Minnesota
R. P. Dahl, University of Minnesota
L. M. Day, Agricultural Research Service, U.S.D.A., Minnesota
S. A. Engene, University of Minnesota
D. F. Fienup, University of Minnesota
C. V. Hess, University of Minnesota
H. R. Jensen, University of Minnesota
E. F. Koller, University of Minnesota
E. W. Learn, University of Minnesota
M. L. Nerlove, Stanford University
T. R. Nodland, University of Minnesota

P. M. Raup, University of Minnesota
W. B. Sundquist, Agricultural Research Service, U.S.D.A., Minnesota

Nominating Committee

W. W. Cochrane, University of Minnesota (Chairman)
R. G. Bressler, University of California
H. C. Trelogan, Agricultural Marketing Service, U.S.D.A.

Committee on New Orientations in Research

H. M. Southworth, Pennsylvania State University (Chairman)
K. L. Bachman, Agricultural Research Service, U.S.D.A.
R. G. Bressler, University of California
G. K. Brinegar, University of Connecticut
R. L. Clodius, University of Wisconsin
S. S. Hoos, University of California
M. L. Nerlove, Stanford University
W. H. Nicholls, Vanderbilt University
H. C. Trelogan, Agricultural Marketing Service, U.S.D.A.

Audit Committee

K. S. Carpenter, Cornell University (Chairman)
C. W. Loomis, Cornell University

Tellers Committee

C. W. Pierce, Pennsylvania State University (Chairman)
W. T. Butz, Pennsylvania State University
J. M. Frey, Pennsylvania State University

Committee to Plan AFEA Directory

L. S. Hardin, Purdue University (Chairman)
H. G. Diesslin, Farm Foundation
H. W. Ottoson, University of Nebraska

Committee on Foreign Society Joint Memberships

N. M. Koffsky, Agricultural Marketing Service, U.S.D.A. (Chairman)
C. D. Kearl, Cornell University
H. L. Stewart, Agricultural Research Service, U.S.D.A.

Committee on Arrangements—1960 Annual Meeting
Over-all Committee

H. B. Howell (Chairman)
Richard Phillips (Vice-Chairman)
Gordon Ball
Ray Beneke
Karl Fox
Staff in Agricultural Economics and Wives, Iowa State University

INDEX TO VOLUME XLII, 1960

SUBJECTS

Adjustment, Agricultural
- The Center for Agricultural and Economic Adjustment, 1114
- Consequences of Acreage Adjustments on Corn-Belt Farms, 905
- Conservation and, 1504
- Developing an Integrated Extension Program on, 1139
- Output and Income Effects of Reducing Farm Labor Force, 779
- Resource Withdrawal in Expanding Urban-Industrial Economy, 1508

Africa, East: Economic Development of Agriculture in, 871

Agricultural Adjustment Act: McNary-Haugen Episode and, 1084

Agricultural Business: Designing Curriculum in, 1489

Agricultural Economics
- An Economist Looks at the Next Fifty Years, 1007
- An Historian Looks at the Past Fifty Years, 994
- Higher Education and—A Critical Appraisal, 969
- Organization and Strategy for Work in, 479
- Ph.D. Degrees Conferred in, 1959, 522
- Teaching of, 1487
- See also Research

Agricultural Supply Firms: Market Power of, 1228

American Farm Economic Association
- Awards Program, 219, 964, 1535
- Committees of, 1546
- Fellows of, preceding page 969
- Minutes, Business and Executive Committee Meetings, 1541
- Reports of Officers and Committees, 1528

Assembly Cost
- Estimating Functions of, for Processing Operations, 767
- Production Density and: in Broiler Processing, 1

Assets
- Fixed: Valuation of, and Linear Programming, 378
- Optimum Replacement Pattern, 755

Beef Grades: How Marking Was Obtained, 133; Note, 878; Reply, 887

Brazil: Economic Impact of Technical Assistance in, 252

Broilers
- Economic Aspects of Production Density, 1
- Estimating Labor Requirements in Production, 1516
- Integration in, 1265
- Optimum Ration Specifications, 69

Capital
- Human and Community, 1210
- Levels of: and Incomes of Small Farmers, 90
- Rationing of, Among Farmers, 325
- See also: Finance

Center for Agricultural and Economic Adjustment: Description, 1114; Appraisal, 1124

Clothing Expenditures of Farm Families, 1525

Cobb-Douglas Function: Difficulties with Results from, 897

Cobweb Theorem: Hog Cycle and, 842

Collectivization in Hungarian Agriculture, 35

Competition: See Interregional Competition, Market Structure

Computers, Electronic: Programs for Data Processing on, 1434

Conservation and Agricultural Adjustment, 1504

Conservation, Soil: Economic Obstacles and Farmers' Attitudes Toward Practice Adoption—Comment, 370; Reply, 376

Consumer
- Acceptance of Lean Pork, 18
- Clothing Expenditures, Farm Families, 1525
- Influence of Impulse Buying on Food Purchases, 317
- Interviewing Techniques and Response Variation, 1523
- See also Grades

Consumption Data, Milk: Response Bias in Collecting from School Children, 699

Cooperatives
- Marketing: Coordination and Vertical Expansion in, 555
- Milk Marketing, 1313

Corn Belt
Consequences of Acreage Adjustments on Farms, 905
Land Substitutes and Changes in Corn Yields, 294
Cost
Allocation of, and the Detection of Unprofitable Ventures, 666
See also Assembly Cost
Credit, Farm: See Finance
Cycle, Hog: Cobweb Theorem and, 842

Dairy Products: See Milk
Data, Agricultural
Committee: Report of, 1539
"Unit Survey" Census in Southern Peru, 608
Data Processing, Electronic: Programs for, 1434
Demand and Supply: Short-Run, for Perishable Vegetables, 1520
Demand for Fertilizer in South Atlantic and East North Central Regions, 676
Demonstration Effects on Production, 659
Development, Agricultural and Economic
East African, 871
Economic Impact of Technical Assistance, Brazil, 252
Factors Affecting Farm Income, Upper East Tennessee Valley, 356
Natural Resources and, 1503
Rise and Decline of Cash Crop in Indian Village, 663
Southern Forest Products and Forestry, 268
Withdrawal of Resources from Agriculture, 1508
See also: Rural Development Program; Surpluses, Agricultural
Dilemma of a Liberal Economist, 864

Eastern Seaboard and Midwest: Conflict of Interest in Milk, 1297
Economic Power: See Market Structure
Education
And Agricultural Economics: A Critical Appraisal, 969
And Soviet Agriculture, 160
As Investment in Human and Community Capital, 1210
Effects of Split Appointments, Teaching and Research, 1493
Goals of, and Agricultural Economics Curricula, 1491
Proposals for Improving College Teaching, 1494
Teaching of Agricultural Economics, 1487
Eisenhower's Wheat Program: Harris Estimation of Treasury Cost of—Comments, 345, 347; Reply, 351
Equations, Systems of, on Electronic Computers, 1445, 1450
Extension
Achieving an Integrated Program on Agricultural Adjustment Problems, 1139
Marketing Viewpoint, 1157
Production Viewpoint, 1151
Public Policy Viewpoint, 1162
Training Needs for Workers in, 1496
See also Rural Development Program

Factor Shares, Regional Differences in, in Agriculture, 52
Farm: See Finance, Labor, Machinery, Management, etc.
Farm Bureau Viewpoint on Comprehensive Supply Control, 1182
Farm of the Future, 1367
Farmers Union View on Supply Control, 1180
Feed: See Rations
Fertilizer
Demand for, South Atlantic and East North Central, 676
Effects of, on Corn Yields, 294
Finance, Farm
Of Representative Farms in 1975, 1380
See also: Capital, Incorporation
Food
Consumers' Purchases of: Influence of Impulse Buying on, 317
Marketing Margins for, 362
Food Chains: Market Power of, 1228, 1247
Food Industries: Profit Rates and Industry Structure in, 1526
Food Processing Firms: Market Power of, 1228
Forest Products and Forestry, Southern: Developments and Prospects, 268

Game Theory
Applied to Market Behavior in Meat Packing Industry, 1261
Integration and, 384
Government, Local, in Sparsely Populated Areas, 827
Grades
Beef: How Marking Was Obtained, 133; Note, 878; Reply, 887

Product Differentiation and Development and, 854
Grain Storage Rules, 576

Heterogeneity in Agriculture: and Definition of Farm Problem, 1509
Hog Cycle and Cobweb Theorem, 842
Hogs
Integration in, 1280
Short-Term Feeding in the Marketing Channel, 1522
See also Pork
Human Resources
Measuring Quality Change in, 1411
Role of Investment in, 1210
Hungary: Collectivization of Agriculture in, 35

Impulse Buying: Influence on Consumers' Food Purchases, 317
Income, Farm
Effects of Levels of Management and Capital on, 90
Effects of Reducing Farm Labor Force, 779
Factors Affecting, in Upper East Tennessee Valley, 356
Human and Community Capital and, 1210
Regional Differences in Factor Shares, 52
See also: Development; Rural Development Program; Policy, Agricultural
Incorporation, Farm
Farm Problem: A Challenge to Social Invention, 811
Technological Breakthrough in Financial-Legal Management, 1498
Index Numbers
New USDA Index of Inputs, 1398
Weather: Influence of, on Crops and Production Aggregates, 180
India
Perspective of, on U.S. Foreign Surplus Disposal, 1031
Rise and Decline of a Cash Crop in a Village in, 663
Inputs, Agricultural
Measurement of, 1411
New USDA Index of, 1398
Nonfarm: Need for Research on, 1511
Integration
And Game Theory, 384
Farm Tenure Perspective of, 307
In Broiler Industry, 1265
In Hog Industry, 1280
Vertical Expansion in Marketing Cooperatives, 555
Inter-Area Relations in Agricultural Supply, 453
International Conference of Agricultural Economists, 967
International Perspective of Foreign Surplus Disposal, 1063
Interregional Competition
In Milk, 1297
In Perishable Vegetables, 1520
Interstate Managerial Survey: Appraisal of Farmer Knowledge Situations Investigated by, 335
Iowa State University Center for Agricultural and Economic Adjustment, 1114
Irrigation
Drought Probabilities and, in Humid Areas, 1518
Economics of Ground Water Allocation for, 150
Rental Market for Water for, in South Platte Basin, 1501
See also Water

Labor, Farm
Effect of Size and Combination of Enterprises on, 79
Estimating Requirements for, in Broiler Production, 1516
Measuring Change in Quality of, 1411
Output and Income Effects of Reducing Farm Labor Force, 779
Land
Accumulation in the Turkish Çukurova, 615
Market Value—Note on, 174; Further Comment, 178
Natural Resources and Economic Growth, 1503
Reclamation Under the Desert Land Act, 1954-59, 629
Liberal Economist: Dilemma of, 864
Linear Programming: See Programming

Machinery, Farm
Evaluation of, Prior to Introduction, 241
Market Power of Manufacturers, 1252
Measuring Flow of Services from, 1411
Management
Cardinal Utility Functions and Managerial Behavior, 118
Demonstration Effects on Production, 659
Farm: Foundation and Fashions in Teaching, 1488

Interstate Managerial Survey, 335
Levels of, and Incomes of Small Farmers, 90
Role of Problem Recognition in, 650
Margins, Marketing, for Farm Foods: Relation of Volume, Prices and Costs to, 362
Market Structure
Economic Power, and Agricultural Policy, 413
Market Power of Food Processing and Agricultural Supply Firms, 1228
In Midwest-Eastern Seaboard Conflict of Interest in Milk, 1313
Profit Rates and, in Food Industries, 1526
Marketing: See Assembly, Consumer, Margins
Marketing Orders: Milk, 1313
McNary-Haugen Episode and the Triple-A, 1084
Meat Packing Industry: Market Power in, 1228, 1256
Midwest and Eastern Seaboard: Conflict of Interest in Milk, 1297
Milk
Carryover Effects in Production Function for, 1512
Midwest-Eastern Seaboard Conflict of Interest, 1297
Pupil Response to Changes in School Milk Prices, 692
Response Bias in Collecting Consumption Data from School Children, 699

Natural Resources and Economic Growth, 1503
News Notes, 210, 514, 727, 950
North Central Region
Demand for Fertilizer in, 676
See also: Corn Belt, Midwest

Obituary: John Donald Black, 223
Organization, Farm
And Structure, of Representative Farms in 1975, 1367
Effect of Size and Combination of Enterprises on Labor Consumption, 79
Output and Income Effects of Reducing the Farm Labor Force, 779

Pasture: Seeding Cropland to Grass, 1514
Peru: "Unit Survey" Census in, 608
Ph.D. Degrees Conferred in Agricultural Economics, 1959, 522
P.L. 480: See Surpluses, Agricultural
Policy, Agricultural
Administration's: In Support of, 401
Collectivization in Hungary, 35
Eisenhower's Wheat Program: Harris Estimation of Treasury Cost of—Comments, 345, 347; Reply, 351
Farm Problem: A Challenge to Social Invention, 811
Farm Programs for Farm Income, 639
Heterogeneity in Agriculture and, 1509
Market Power and the Farm Problem, 1228
Market Structure, Economic Power and, 413
McNary-Haugen Episode and the Triple-A, 1084
U.S. Department of Agriculture as Instrument of, 1084, 1094
See also: Adjustment, Development, Income, Supply Control, Surpluses, Taxation, Trade Policy
Pork
Consumer Acceptance of Lean, 18
Spatial Equilibrium Model of Marketing System for—Note, 890; Reply, 896
Poultry, See Broilers
Power, Economic: See Market Structure
Price
Collins' Changing Role of—Comment on, 385; Reply, 388
Response to Changes in, in School Milk, 692
See also Margins
Producers' Quasi-Supply During Stock Period—Comment, 389; Reply, 395
Product Differentiation and Product Development: Uniform Grades and Standards and, 854
Product, Marginal Physical: Computation of Variance Estimates, 596
Production
Demonstration Effects on, 659
Density, Broilers: Economic Aspects, 1
Indexes of Weather Influence on, 180
Production Control: See Supply Control
Production Function
Animal, and Optimum Ration Specifications, 69
Difficulties with Results from Cobb-Douglas Type, 897
Milk: Carryover Effects in, 1512
Productivity, Agricultural: and Measurement of Inputs, 1411
Programming
Cost Allocation and Detection of Unprofitable Ventures, 666

Dynamic: Reflections on, 920
Linear
And Economies of Size, 103
Fixed Asset Valuation and, 378
On High Speed Computers, 1439
Small Watershed Development, 225
Programs for Data Processing on Electronic Computers, 1434
Protectionism, New Agricultural: Effect on Trade Policy, 797
Publications Received, 187, 493, 704, 927

Quality Characteristics: and Theory of Integration, 1280
Quality of Inputs: Measuring Changes in, 1411
Quality, Product: See Grades

Rations
Dairy: Carryover Effects in, 1512
Optimum Specifications, and Animal Production Functions, 69
Reclamation Under the Desert Land Act, 1954-59, 629
Regional Differences in Factor Shares in American Agriculture, 52
Regression Analysis
On Electronic Computers, 1450
Tolerance Interval for, 910
Replacement, Optimum Pattern of: Analytical Techniques, 755
Research in Agricultural Economics
Are Agricultural Economists Becoming Mechanics? 1475
Identification of Problems, 1459
Response Bias in Collecting Milk Consumption Data from School Children, 699
Response Variation and Interviewing Techniques, 1523
Resources
Natural, and Economic Growth, 1503
Withdrawal of Agricultural, in an Expanding Urban-Industrial Economy, 1508
See also Human Resources
Risk
Managerial Behavior and Cardinal Utility Functions, 118
See also Finance
Rural Development Program
Framework for, 567
And Underemployment in Agriculture, 1196

Sociology: Agricultural Economists' Need Training in, 1487
South
Demand for Fertilizer in, 676
Forest Products and Forestry, 268
Investment in Human and Community Capital, 1210
Land Substitutes and Changes in Corn Yields, 294
Levels of Management and Capital: and Incomes of Small Farmers, 90
Role of Problem Recognition in Managerial Adjustments, 650
Soviet Union: Higher Education and Agriculture in, 160
Spatial Equilibrium Model—Note on, 890; Reply, 896
Standards: See Grades
Storage Rules, Grain, 576
Structure: See Market Structure
Substitution, Marginal Rate of: Variance Estimates for, 596
Supply, Agricultural
Analysis of Changes in, 531
Demand and, Short-Run, for Perishable Vegetables, 1520
Estimate of U.S. Aggregate Supply Function, 282
Inter-Area Relations in, 453
State of Analysis of, 435
Supply Control
Farm Bureau Viewpoint on, 1182
Farmers Union Viewpoint on, 1180
Ideas, Implications, and Measures, 1167
Independent Viewpoint on, 1190
Market Structure, Economic Power and Agricultural Policy: A Proposal for Forward Production Control, 413
Surpluses, Agricultural
Impact and Implications of Foreign Disposal of, 1019, 1052
Competitor's Perspective, 1052
Indian Perspective, 1031
International Perspective, 1063
Value of U.S., to Underdeveloped Countries, 1019

Taxation
Income: Farmer Compliance, 686
Rise and Decline of Cash Crop in Indian Village, 663
Teaching Agricultural Economics, 1487
See also Education
Technical Advance and Migration: Impact of, on Agricultural Society and Policy—Correction, 926
Technical Assistance: See Development

Technological Change, Research on Economics of, 735
Tennessee Valley, Upper East: Factors Affecting Gross Farm Income Per Worker in, 356
Tenure, Farm
  Perspective of Vertical Integration, 307
  Role of Large-Scale Landlords in Improving Farm Tenancy, 1500
  Where Tenants may Profit by Seeding Cropland to Grass, 1514
  See also Finance
Tobacco
  Evaluation of Harvesting Machine prior to Introduction, 241
  Rise and Decline of a Cash Crop in an Indian Village, 663
Tolerance Interval for Multiple Regression, 910
Trade Policy: Effect of New Agricultural Protectionism, 797
Transportation: See Assembly Cost
Turkey: Land Accumulation in, 615

Underdeveloped Countries: See Development, Surpluses
Underemployment, Agricultural: Rural Development Program and, 1196
"Unit Survey" Census in Southern Peru, 608
United States Department of Agriculture
  As Instrument of Public Policy, 1084, 1094
  McNary-Haugen Episode and the Triple-A, 1084
Utility Functions, Cardinal, and Managerial Behavior, 118

Variance and Covariance: Analysis of, on Electronic Computers, 1434
Variance Estimates for Marginal Physical Products and Marginal Rates of Substitution, 596
Vegetables, Perishable: Short-Run Demand and Supply Curves, 1520

Water
  Allocation of
    Economics of, for Ground Water, 150
    Legal and Institutional Controls in, 1345
    Price and Assessment Guides to, 1332
  Rural-Urban Competition for, 1332
  See also Irrigation
Watershed, Small: Programming Development of, 225
Weather
  Effect on Production Relations, 294
  Indexes of Influence of, on Production, 180
  Yield Reductions Caused by Drought, 1518
West
  Seeding Cropland to Grass, 1514
  See also: Irrigation, Water
Wheat: Seeding Cropland to Grass, 1514
Wheat Program, Eisenhower's: Harris Estimation of Treasury Cost of—Comments, 345, 347; Reply 351
Wisconsin: Pupil Response to Changes in School Milk Prices, 692

AUTHORS

Allee, David J.
  Discussion: Rural-Urban Competition for Water, 1359
Allin, Bushrod W.
  The U.S. Department of Agriculture as an Instrument of Public Policy: In Retrospect and in Prospect, 1094
Anderson, Kenneth E., and Hoofnagle, William S.
  Problems of Response Bias in Collecting Milk Consumption Data from School Children, 699
Anderson, Raymond L.
  Operation of the Irrigation Water Rental Market in the South Platte Basin, 1501

Arscott, G. H., and Brown, William G.
  Animal Production Functions and optimum Ration Specifications, 69

Bachman, Kenneth L., and Nerlove, Marc
  The Analysis of Changes in Agricultural Supply: Problems and Approaches, 531
Back, W. B.
  Discussion: The Identification of Problems in Agricultural Economics Research, 1471
Baker, C. B., Fruin, J. E., and West, V. I.
  Consequences of Acreage Adjustments on Corn-Belt Farms, 905
Baker, J. A.
  Supply Control: Farmers Union View, 1180

Balassa, Bela A.
Collectivization in Hungarian Agriculture, 35
Barlowe, Raleigh
Natural Resources and Economic Growth, 1503
Barnard, C. S., and Smith, Victor E.
Cost Allocation and the Detection of Unprofitable Ventures, 666
Barton, Glen T.
Discussion: Agricultural Supply Analysis, 473
Barton, Glen T., and Durost, Donald D.
The New USDA Index of Inputs, 1398
Benedict, Murray R.
See Reviews (Heady, Earl O.), 503
Beringer, Christoph, and Halter, Albert N.
Cardinal Utility Functions and Managerial Behavior, 118
Berry, Russell L.
The Probable Role of Large-Scale Landlords in Farm Tenancy Improvement, 1500
Bird, Alan R.
Reorienting the Training of Agricultural Economists in Conformity with Changing Research Needs, 1487
Bishop, C. E.
The Rural Development Program and Underemployment in Agriculture, 1196
Blaich, O. P.
Integration in Theory with an Application to Hogs, 1280
Blase, Melvin G.
Conservation and Agricultural Adjustment—Competitive or Complementary? 1504
Blase, Melvin G., and Timmons, John F.
Comments on Economic Obstacles and Farmers' Attitudes Toward Soil Conservation Practice Adoption, 370
Bonnen, James T.
Discussion: The Farm Policy Debate, 429
Bottum, J. Carroll
The Center for Agricultural and Economic Adjustment: A Description, 1114
Brake, John R.
Fertilizer Demand in the South Atlantic and East North Central Regions, 676
Brandow, G. E.
Supply Control: Ideas, Implications, and Measures, 1167
Brandow, G. E., and Buse, Rueben C.
The Relationship of Volume, Prices and Costs to Marketing Margins for Farm Foods, 362
Brandt, Karl
See Reviews (Cavin, James Pierce), 714
Branson, Robert E., and Courtenay, Henry V.
An Analysis of Response Variation Encountered with Selected Interviewing Techniques in Consumer Market Research, 1523
Bredo, William
See Reviews (Mukherjee, P. K.), 205
Breimyer, Harold F.
Heterogeneity in Agriculture: Impediment to Definition of the Farm Problem, 1509
Brewster, John
Correction to "Impact of Technical Advance and Migration on Agricultural Society and Policy," 926
Brown, William G., and Arscott, G. H.
Animal Production Functions and Optimum Ration Specifications, 69
Buse, Rueben C., and Brandow, G. E.
The Relationship of Volume, Prices and Costs to Marketing Margins for Farm Foods, 362

Callahan, E. P.
Some Training Needs of Extension Workers in Farm Management and Production Economics, 1496
Candler, Wilfred
Reflections on "Dynamic Programming Models," 920
Carstensen, Vernon
An Historian Looks at the Past Fifty Years of the Agricultural Economics Profession, 994
Castle, Emery N., and Lindeborg, Karl H.
The Economics of Ground Water Allocation: A Case Study, 150
Caton, Douglas D.
See Reviews (Christenson, Reo M.), 201
Chastain, E. D., and Lee, John E., Jr.
The Role of Problem Recognition in Managerial Adjustments, 650
Chauhan, Brij Raj

Rise and Decline of a Cash Crop in an Indian Village, 663
Child, Frank C.
Producers' Quasi-Supply During Stock Period—A Comment, 389
Christensen, S. Kent
Discussion: The Superior Market Power of Food Processing and Agricultural Supply Firms, 1247
Clifton, Elliott S.
Discussion: Market Power in the Meat Packing Industry, 1256
Clodius, Robert L.
Market Structure, Economic Power and Agricultural Policy: A Proposal for Forward Production Control, 413
Collins, Norman R.
Collins' Changing Role of Price—A Reply, 388
Collins, Norman R., and Schrader, Lee F.
Relation of Profit Rates to Industry Structure in the Food Industries, 1526
Conklin, Howard E.
Are Agricultural Economists Becoming Mechanics? 1475
Cook, Hugh L., and Halvorson, Harlow W.
Pupil Response to Changes in School Milk Prices in Wisconsin, 692
Courtenay, Henry V., and Branson, Robert E.
An Analysis of Response Variation Encountered with Selected Interviewing Techniques in Consumer Market Research, 1523
Coutu, Arthur J., Martin, Lee R., and Singh, H. S.
The Effects of Different Levels of Management and Capital on the Incomes of Small Farmers in the South, 90
Cromarty, W. A.
See Reviews (Valavanis, Stefan), 507

Dalrymple, Dana G.
Higher Education and Soviet Agriculture, 160
Dean, Gerald W.
Consideration of Time and Carryover Effects in Milk Production Functions, 1512
Dillon, John L.
Integration and Game Theory, 384
Doll, John P., Jebe, Emil H., and Munson, Robert D.
Computation of Variance Estimates for Marginal Physical Products and Marginal Rates of Substitution, 596
Dorner, Peter
The Farm Problem: A Challenge to Social Invention, 811
Downen, M. Lloyd, and Dubov, Irving
The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk: The Role of Market Structures and Other Institutional Arrangements, 1313
Dubov, Irving, and Downen, M. Lloyd
The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk: The Role of Market Structures and Other Institutional Arrangements, 1313
Dunbar, John O.
Developing an Integrated Extension Program on Agricultural Adjustment Problems—The Production Viewpoint, 1151
Durost, Donald D., and Barton, Glen T.
The New USDA Index of Inputs, 1398

Ehlers, Wayne F.
Economic Implications of Drought Probabilities for Humid Area Irrigation, 1518
Eisenpress, Harry, and Foote, Richard J.
Systems of Simultaneous Equations on the IBM 704 and 709, 1445
Ezekiel, Mordecai
Impact and Implications of Foreign Surplus Disposal—The International Perspective, 1063
See Reviews (Tinbergen, Jan), 938

Faris, J. Edwin
Analytical Techniques Used in Determining the Optimum Replacement Pattern, 755
Farris, Donald E.
Short-Run Demand and Supply Curves for Perishable Vegetables and Their Use in Analysis of Interregional Competition, 1520
Farris, Paul L.
Uniform Grades and Standards, Product Differentiation and Product Development, 854
Fellows, Irving F.
Discussion: Comparative Advantage

Aspects of Midwest-Eastern Seaboard Conflict of Interest in Production and Distribution of Milk, 1310
Finley, Robert M., and Fischer, Loyd K.
Proposals for Improving College Teaching, 1494
Fischer, Loyd K., and Finley, Robert M.
Proposals for Improving College Teaching, 1494
Fite, Gilbert C.
The McNary-Haugen Episode and the Triple-A, 1034
Fletcher, L. B.
See Reviews (Allen, G. R.), 720
Foote, Richard J., and Eisenpress, Harry
Systems of Simultaneous Equations on the IBM 704 and 709, 1445
Fowler, Mark L.
See Reviews (Cox, Clifton B.), 203
French, Ben C.
Some Considerations in Estimating Assembly Cost Functions for Agricultural Processing Operations, 767
French, Charles E., and Kehrberg, Earl W.
The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk—The Comparative Advantage Aspects, 1297
Freund, Rudolf J.
Linear Programming on High Speed Computers, 1439
Fruin, J. E., Baker, C. B., and West, V. I.
Consequences of Acreage Adjustments on Corn-Belt Farms, 905

Gaffney, Mason
Discussion: Rural-Urban Competition for Water, 1363
Gardner, B. D.
Discussion: Measuring Input Changes in Agriculture, 1430
Gardner, Wayland D.
Farm Income Tax Compliance, 686
Gertel, Karl, and Wollman, Nathaniel
Price and Assessment Guides to Western Water Allocation, 1332
Giaever, Harald, and Seagraves, James
Linear Programming and Economies of Size, 103
Gislason, Conrad
Grain Storage Rules, 576
Grandage, Arnold
Existing Programs for Data Processing on Electronic Computers: Analysis of Variance and Covariance, 1434
Gregory, G. R.
See Reviews (Duerr, William A.), 722
Griliches, Zvi
Estimates of the Aggregate U.S. Farm Supply Function, 282
Measuring Inputs in Agriculture: A Critical Survey, 1411

Halter, A. N.
The Identification of Problems in Agricultural Economics Research, 1459
Halter, Albert N., and Beringer, Christoph
Cardinal Utility Functions and Managerial Behavior, 118
Halvorson, Harlow W.
Regression and Systems of Equations Analysis on the IBM-650, 1450
Halvorson, Harlow W., and Cook, Hugh L.
Pupil Response to Changes in School Milk Prices in Wisconsin, 692
Hamilton, Carl
Discussion: The Iowa Center for Agricultural and Economic Adjustment, 1135
Hamilton, W. E.
A Comment on the Harris Estimation of the Treasury Cost of Eisenhower's Wheat Program, 345
Comprehensive Supply Control: The Farm Bureau Viewpoint, 1182
Harlow, Arthur A.
The Hog Cycle and the Cobweb Theorem, 842
Harris, Curtis C., Jr.
On the Harris Estimation of the Treasury Cost of Eisenhower's Wheat Program: A Reply, 351
Harris, Marshall
Nonfarm Inputs in Agricultural Production: A Research Proposal, 1511
Hartman, L. M., and Tolley, G. S.
Inter-Area Relations in Agricultural Supply, 453
Hassler, J. B.
See Reviews (Hogg, Robert V.), 724
Hathaway, D. E.
Potentialities and Limitations of Com-

prehensive Supply Control: An Independent Viewpoint, 1190
Hein, Clarence J.
Rural Local Government in Sparsely Populated Areas, 827
Henderson, James M.
See Reviews (Isard, Walter), 942
Henry, W. R., and Raunikar, Robert
Integration in Practice—The Broiler Case, 1265
Henry, William R., and Seagraves, James A.
Economic Aspects of Broiler Production Density, 1
Hesser, L. F.
Conceptual Models of Capital Rationing Among Farmers, 325
Hicks, John W.
The Dilemma of a Liberal Economist, 864
Hildebrand, John R.
Some Difficulties with Empirical Results from Whole-Farm Cobb-Douglas-Type Production Functions, 897
Hillman, Jimmye S.
Collins' Changing Role of Price, 385
See Reviews: (Allen, W. R.) 208; (Condliffe, John B.) 718
Hiltner, John
Land Accumulation in the Turkish Çukurova, 615
Hobbes, John C.
A "Unit Survey" Census in Southern Peru, 608
Hoofnagle, William S., and Anderson, Kenneth E.
Problems of Response Bias in Collecting Milk Consumption Data from School Children, 699
Hubbard, Deon W.
The Incorporation of Farms and Ranches—A Technological Breakthrough in Agricultural "Financial-Legal" Management, 1498
Hubbard, John W.
An Appraisal of the Farmer Knowledge Situations Investigated by the Interstate Managerial Survey, 335
Huberty, Martin R.
See Reviews (Jarrett, Henry), 508
Hughes, Rufus B., Jr.
Demonstration Effects on Production, 659
Jaenke, E. A., Rhodes, V. James, Naumann, H. D., and Kiehl, Elmer R.
Consumer Acceptance of Lean Pork, 18
Jamison, John A.
Coordination and Vertical Expansion in Marketing Cooperatives, 555
Jebe, Emil H., Doll, John P., and Munson, Robert D.
Computation of Variance Estimates for Marginal Physical Products and Marginal Rates of Substitution, 596
Johnson, D. Gale
Output and Income Effects of Reducing the Farm Labor Force, 779
Johnson, Glenn L.
The State of Agricultural Supply Analysis, 435
Johnson, Paul R.
Land Substitutes and Changes in Corn Yields, 294
Judge, G. G., and Wallace, T. D.
A Reply to: "A Note on Analytical Models," 896
Juers, Linley E.
Discussion: Role of Market Structures and Other Institutional Arrangements in the Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk, 1327

Kehrberg, Earl W., and French, Charles E.
The Midwest-Eastern Seaboard Conflict of Interest in the Production and Distribution of Milk—the Comparative Advantage Aspects, 1297
Kiehl, Elmer R., Rhodes, V. James, Naumann, H. D., and Jaenke, E. A.
Consumer Acceptance of Lean Pork, 18
Kindeborg, Karl H., and Castle, Emery N.
The Economics of Ground Water Allocation: A Case Study, 150
Kirkendall, Richard S.
Discussion: The U.S. Department of Agriculture as an Instrument of Public Policy, 1103
Kottke, Marvin W.
Withdrawal of Resources out of Agriculture in an Expanding Urban-Industrial Economy, 1508

Krishna, Raj
Discussion: The Role of Investment in Human and Community Capital, 1221
Kristjanson, R. L.
Discussion: Impact of Surplus Disposal on Foreign Competitors and the International Perspective on Surplus Disposal, 1081

Landstrom, Karl S.
Reclamation Under the Desert Land Act, 1954-59, 629
Langvatn, Harry N.
An Approach to the Effect of Size and Combination of Enterprises on Farm Labor Consumption, 79
Lanzillotti, Robert F.
The Superior Market Power of Food Processing and Agricultural Supply Firms—Its Relation to the Farm Problem, 1228
Lee, John E., Jr., and Chastain, E. D.
The Role of Problem Recognition in Managerial Adjustments, 650
Lewis, A. B.
Foundation and Fashions in Farm Management Teaching, 1488
Lindeborg, Karl H., and Castle, Emery N.
The Economics of Ground Water Allocation: A Case Study, 150
Livermore, D. Upton
Developing an Integrated Extension Program on Agricultural Adjustment Problems—The Marketing Viewpoint, 1157
Lu, John Y.
Tolerance Interval for Multiple Regression, 910

Maier, Frank H.
Discussion: Integration in Theory with an Application to Hogs, 1293
Manderscheid, Lester V.
Designing the Agricultural Business Curriculum, 1489
Martin, Lee R.
The Role of Investment in Human and Community Capital, 1210
Martin, Lee R., Coutu, Arthur J., and Singh, H. S.
The Effects of Different Levels of Management and Capital on the Incomes of Small Farmers in the South, 90
Masucci, Robert H.
Discussion: Measuring Input Changes in Agriculture, 1427
McDermott, J. K.
A Framework for Rural Development, 567
Mehren, George L.
Organization and Strategy for Agricultural Economics Work, 479
Miller, Walter G.
Farm Tenure Perspective of Vertical Integration, 307
Milliman, J. W.
Land Values—A Further Comment, 178
Mills, Gordon
Fixed Asset Valuation and Linear Programming, 378
Mortensen, Erik
Impact and Implications of Foreign Surplus Disposal on Developed Economies and Foreign Competitors—The Competitor's Perspective, 1052
Mueller, Willard F.
An Economist Looks at the Next Fifty Years of the Profession, 1007
Munson, Robert D., Doll, John P., and Jebe, Emil H.
Computation of Variance Estimates for Marginal Physical Products and Marginal Rates of Substitution, 596
Myers, Max
Discussion: Impact and Implications of Foreign Surplus Disposal on Developed Economies and Foreign Competitors, 1077
Myrick, D. C.
Discussion: The Farm of the Future, 1390

Naumann, H. D., Rhodes, V. James, Kiehl, Elmer R. and Jaenke, E. A.
Consumer Acceptance of Lean Pork, 18
Nelson, Aaron G.
Financing Representative Farms in 1975, 1380
Nerlove, Marc, and Bachman, Kenneth L.
The Analysis of Changes in Agricultural Supply: Problems and Approaches, 531
Nesius, Ernest J.
Discussion: The Rural Development Program and Underemployment in Agriculture, 1206
Nicholls, William H.
Factors Affecting Gross Farm Income

Per Worker, Upper East Tennessee Valley, 1899-1954, 356
Higher Education and Agricultural Economics: A Critical Appraisal, 969

Olson, R. O.
Discussion: Impact and Implications of Foreign Surplus Disposal on Underdeveloped Economies, 1042
Ottoson, Howard W.
Discussion: The Farm of the Future, 1394

Paarlberg, Don
In Support of the Administration's Farm Policy, 401
Parks, W. Robert
The Fiftieth Year Celebration Continued: Welcoming Remarks, 991
Parsons, Kenneth H.
See Reviews (Senior, Clarence), 198
Pavelis, George A., and Timmons, John F.
Programming Small Watershed Development, 225
Penn, Raymond J.
Discussion: The Iowa Center for Agricultural and Economic Adjustment, 1132
Pesek, Boris P.
Producers' Quasi-Supply During Stock Period—Reply, 395
Pikl, I. James, Jr.
Southern Forest-Products and Forestry: Developments and Prospects, 268
Plath, C. V.
See Reviews (Yang, W. Y.), 510
Prundeanu, Julian, and Zwerman, Paul J.
A Reply to: "Comments on Economic Obstacles and Farmers' Attitudes Toward Soil Conservation Practice Adoption," 376

Ratchford, C. B.
Achieving an Integrated Extension Program on Agricultural Adjustment Problems, 1139
Raunikar, Robert, and Henry, W. R.
Integration in Practice—The Broiler Case, 1265
Renshaw, Edward F.
Models of the Land Market—A Note, 174
See Reviews (Hammond, R. J.), 946
Rhodes, V. James
How the Marking of Beef Grades Was Obtained, 133
Reply to Williams, 887
Rhodes, V. James, Naumann, H. D., Kiehl, Elmer R., and Jaenke, E. A.
Consumer Acceptance of Lean Pork, 18
Rice, Ted
The Eisenhower Wheat Program—A Comment, 347
Richards, Allen B.
Goals of Education and Their Relation to Agricultural Economics Curricula, 1491
Roy, Ewell P.
Discussion: Integration in Practice—The Broiler Case, 1274
Ruttan, Vernon W.
Research on the Economics of Technological Change in American Agriculture, 735
Ruttan, Vernon W., and Stout, Thomas T.
Regional Differences in Factor Shares in American Agriculture: 1925-1957, 52

Schnittker, John A.
The Center for Agricultural and Economic Adjustment: An Appraisal, 1124
Schrader, Lee F., and Collins, Norman R.
Relation of Profit Rates to Industry Structure in the Food Industries, 1526
Schultz, Theodore W.
Value of U.S. Farm Surpluses to Underdeveloped Countries, 1019
Seagraves, James A.
Estimating Labor Requirements—A Broiler Production Example, 1516
Seagraves, James A., and Henry, William R.
Economic Aspects of Broiler Production Density, 1
Seagraves, James, and Giaever, Harald
Linear Programming and Economies of Size, 103
Sen, S. R.
Impact and Implications of Foreign Surplus Disposal on Underdeveloped Economies—The Indian Perspective, 1031
Shaffer, James Duncan
The Influence of "Impulse Buying" or In-The-Store Decisions on Consumers' Food Purchases, 317
Shepherd, Geoffrey
Farm Programs for Farm Income, 639
Singh, H. S., Martin, Lee R., and Coutu, Arthur J.

The Effects of Different Levels of Management and Capital on the Incomes of Small Farmers in the South, 90
Sitler, Harry G.
Where Tenants may Profit by Seeding Cropland to Grass, 1514
Sitterley, John H.
See Reviews (Wibberley, G. P.), 716
Slater, George R.
Discussion: The Relative Market Power of Farm Machinery Manufacturers, 1252
Smith, Cecil N.
See Reviews (Bowring, James R.), 940
Smith, Stephen C.
Legal and Institutional Controls in Water Allocation, 1345
Smith, Victor E., and Barnard, C. S.
Cost Allocation and the Detection of Unprofitable Ventures, 666
Snodgrass, Milton M.
The Effect of Split Appointments on Undergraduate Teaching, 1493
Sosnick, Stephen H.
See Reviews (Kaysen, Carl), 933
Stallings, James L.
Weather Indexes, 180
Stewart, H. L.
The Organization and Structure of Some Representative Farms in 1975, 1367
Stone, P. S., and Toussaint, W. D.
Evaluating a Farm Machine Prior to Its Introduction, 241
Stout, Roy G.
A Note on Analytical Models; The Need for Caution in Assumptions and Data Use, 890
Stout, Thomas T.
Reflections on the Economic Implications of Short-Term Hog Feeding Programs in the Marketing Channel, 1522
Stout, Thomas T., and Ruttan, Vernon W.
Regional Differences in Factor Shares in American Agriculture: 1925-1957, 52
Swanson, Earl R.
Discussion: Are Agricultural Economists Becoming Mechanics? 1483
See Reviews (Bennion, Edward G.), 944
Swerling, Boris C.
Discussion: The Farm Policy Debate, 425
Talbot, Ross B.
The Past is Prologue; What Are the Prospects? 1107
Thomas, M. D.
Developing an Integrated Extension Program on Agricultural Adjustment Problems—The Public Policy Viewpoint, 1162
Timmons, John F., and Blase, Melvin G.
Comments on Economic Obstacles and Farmers' Attitudes Toward Soil Conservation Practice Adoption, 370
Timmons, John F., and Pavelis, George A.
Programming Small Watershed Development, 225
Tolley, G. S., and Hartman, L. M.
Inter-Area Relations in Agricultural Supply, 453
Toussaint, W. D., and Stone, P. S.
Evaluating a Farm Machine Prior to Its Introduction, 241

Walker, David
A Note on the Economic Development of East African Agriculture, 871
Wallace, T. D., and Judge, G. G.
Reply to: "A Note on Analytical Models," 896
Ward, Edward H.
See Reviews (Abbott, J. C.), 512
Watts, Harold W.
Discussion: Agricultural Supply Analysis, 477
West, V. I., Fruin, J. E., and Baker, C. B.
Consequences of Acreage Adjustments on Corn-Belt Farms, 905
Wharton, Clifton R., Jr.
The Economic Impact of Technical Assistance: A Brazilian Case Study, 252
Wheeler, Leslie A.
The New Agricultural Protectionism and Its Effect on Trade Policy, 797
Williams, Willard F.
A Note on "How the Marking of Beef Grades Was Obtained," 878
Winakor, Geitel
Clothing Expenditures of Account-Keeping Illinois Farm Families, 1929-1958, 1525
Witt, Lawrence
Discussion: Impact and Implications of Foreign Surplus Disposal

on Underdeveloped Economies, 1046
Wollman, Nathaniel, and Gertel, Karl Price and Assessment Guides to Western Water Allocation, 1332
Zwerman, Paul J., and Prundeanu, Julian A Reply to: "Comments on Economic Obstacles and Farmers' Attitudes Toward Soil Conservation Practice Adoption," 376

REVIEWS

(By author of publication—reviewer in parentheses)

Abbott, J. C., *Marketing Problems and Improvement Programs* (Ward, Edward H.), 512
Allen, C. L. (see Allen, W. R.)
Allen, G. R., *Agricultural Marketing Policies* (Fletcher, L. B.), 720
Allen, W. R., and Allen, C. L. (Eds.), *Foreign Trade and Finance* (Hillman, Jimmye S.), 208

Bennion, Edward G., *Elementary Mathematics of Linear Programming and Game Theory* (Swanson, Earl R.), 944
Bowring, James R., Southworth, Herman M., and Waugh, Frederick V., *Marketing Policies for Agriculture* (Smith, Cecil N.), 940

Cavin, James Pierce (Ed.), *Economics for Agri. ure. Selected Writings of John D. Black* (Brandt, Karl), 714
Christenson, Reo M., *The Brannan Plan: Farm Politics and Policy* (Caton, Douglas D.), 201
Condliffe, John B., *The Welfare State in New Zealand* (Hillman, Jimmye), 718
Cox, Clifton B., and Pherson, Vernon W., *The Competitive Potential of the U.S. Cotton Industry* (Fowler, Mark L.), 203
Craig, Allen T. (see Hogg, Robert V.)

Duerr, William A., *Fundamentals of Forestry Economics* (Gregory, G. R.), 722

Hammond, R. J., *Benefit-Cost Analysis and Water Pollution Control* (Renshaw, Edward F.), 946
Heady, Earl O. (Ed.), *Problems and Policies of American Agriculture* (Benedict, Murray R.), 503
Hogg, Robert V., and Craig, Allen T., *Introduction to Mathematical Statistics* (Hassler, J. B.), 724

Isard, Walter, Schooler, Eugene, and Vietorisz, Thomas, *Industrial Complex Analysis and Regional Development: A Case Study of Refinery-Petrochemical-Synthetic-Fiber Complexes and Puerto Rico* (Henderson, James M.), 942

Jarrett, Henry (Ed.), *Science and Research, Prospects and Implications of Technical Advance* (Huberty, Martin R.), 508

Kaysen, Carl, and Turner, Donald F., *Antitrust Policy, An Economic and Legal Analysis* (Sosnick, Stephen H.), 933

Mukherjee, P. K., *Economic Surveys in Under-Developed Countries—A Study in Methodology* (Bredo, William), 205

Pherson, Vernon W. (see Cox, Clifton B.)

Schooler, Eugene (see Isard, Walter)
Senior, Clarence, *Land Reform and Democracy* (Parsons, Kenneth H.), 198
Southworth, Herman M. (see Bowring, James R.)

Tinbergen, Jan, *The Design of Development* (Ezekiel, Mordecai), 938
Turner, Donald F. (See Kaysen, Carl)

Valavanis, Stefan, *Econometrics* (Cromarty, W. A.), 507
Vietorisz, Thomas (see Isard, Walter)

Waugh, Frederick V. (see Bowring, James R.)
Wibberley, G. P., *Agriculture and Urban Growth (A Study of the Competition for Rural Land)* (Sitterley, John H.), 716

Yang, W. Y., *Methods of Farm Management Investigations* (Plath, C. V.), 510

AMERICAN FARM ECONOMIC ASSOCIATION

SUSTAINING MEMBERS

ANDERSON, CLAYTON & COMPANY
Houston, Texas

ARCHER-DANIELS-MIDLAND COMPANY
Minneapolis, Minnesota

ARMOUR AND COMPANY
Chicago, Illinois

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY
Amarillo, Texas

BROWN & WILLIAMSON TOBACCO CORPORATION
Louisville, Kentucky

CARGILL, INC.
Minneapolis, Minnesota

THE CHAMPION PAPER AND FIBRE COMPANY
Hamilton, Ohio

CONSUMERS COOPERATIVE ASSOCIATION
Kansas City, Missouri

COTTON PRODUCERS ASSOCIATION
Atlanta, Georgia

DEERE & COMPANY
Des Moines, Iowa

FIRST BANK STOCK CORPORATION
Minneapolis, Minnesota

GREEN GIANT COMPANY
Le Sueur, Minnesota

ILLINOIS FARM SUPPLY COMPANY
Chicago, Illinois

INTERNATIONAL HARVESTER COMPANY
Chicago, Illinois

MEREDITH PUBLISHING COMPANY
Des Moines, Iowa

NORTHWESTERN MUTUAL LIFE INSURANCE COMPANY
Milwaukee, Wisconsin

F. H. PEAVEY & COMPANY
Minneapolis, Minnesota

PILLSBURY MILLS, INC.
Minneapolis, Minnesota

PIONEER HI-BRED CORN COMPANY
Des Moines, Iowa

RALSTON PURINA COMPANY
St. Louis, Missouri

RAYONIER INCORPORATED
Fernandina Beach, Florida

TRUST COMPANY OF GEORGIA
Atlanta, Georgia

UNITED-HAGIE HYBRIDS, INC.
Des Moines, Iowa

UNITED STATES BEET SUGAR ASSOCIATION
Washington, D.C.

THE AMERICAN FARM ECONOMIC ASSOCIATION

President
WILLIAM H. NICHOLLS
Vanderbilt University

President-Elect
BUSHROD W. ALLIN
Agricultural Marketing Service

Vice Presidents
LAWRENCE L. BOGER
Michigan State University

ROBERT L. CLODIUS
University of Wisconsin

Secretary-Treasurer
C. DEL MAR KEARL
Cornell University

Editor
HERMAN M. SOUTHWORTH
Pennsylvania State University

Associate Editor
ROBERT H. McALEXANDER
Pennsylvania State University

Book Review Editor
CHESTER O. McCORKLE, JR.
University of California

Editorial Council

M. E. ANDAL, Canada Department of Agriculture
JAMES N. BOLES, University of California
JAMES P. CAVIN, Agricultural Marketing Service
ARVAL ERIKSON, Oscar Mayer Company
DALE E. HATHAWAY, Michigan State University
RAYMOND J. PENN, University of Wisconsin.
ROBERT W. RUDD, University of Kentucky
RAYMOND C. SCOTT, Federal Extension Service
ORLIN J. SCOVILLE, Agricultural Research Service
BERNARD F. STANTON, Cornell University
HARRY A. STEELE, Agricultural Research Service
EARL R. SWANSON, University of Illinois

Editorial communications including manuscripts submitted for publication or inquiries concerning the *Journal* should be addressed to Herman M. Southworth, Department of Agricultural Economics and Rural Sociology, 208 Weaver Building, Pennsylvania State University, University Park, Pennsylvania.

Communications concerning books for review and books, bulletins, and other publications submitted for announcement in the *Journal* should be addressed to Chester O. McCorkle, Jr., Department of Agricultural Economics, University of California, Davis, California.

Applications for membership, changes in address, or inquiries regarding the general affairs of the Association should be addressed to C. Del Mar Kearl, Department of Agricultural Economics, Cornell University, Ithaca, New York.

Nonmember subscription rates $9 annually.

GEORGE BANTA COMPANY, INC., MENASHA, WISCONSIN

#387